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THE ESTABLISHMENT OF TREPONEMA PALLIDUM AS THE CAUSATIVE AGENT OF SYPHILIS, AND THE CULTURAL DIFFERENTIATION BETWEEN THIS ORGANISM AND CERTAIN MORPHOLOGICALLY ALLIED SPIROCHÆTÆ

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CLINICIANS have long recognized the infectious nature of syphilis, but it is only since the inauguration of scientific microbiology by Pasteur, Koch, and their pupils, that the cause of the disease has been more zealously studied. A definite ætiological relation was soon established, step by step, between certain parasitic microörganisms and the morbid processes constantly associated with them. According to Koch, the following conditions must prevail in order that this relation exist. The organism must be found constantly in sufficiently large numbers; it must not be found in other diseases; it must be capable of producing the same pathological changes when introduced into a suitable host in pure culture as it does in the disease of which it is supposed to be the cause. Since the laying down of the above requirements by Koch, other important phenomena, such as immunity, anaphylaxis, and allergy, have been proven to become essential factors in determining the ætiological relation between an organism and a given disease. Indeed, only through definite, immunity phenomena were certain pathogenic organisms first recognized as ætiological factors of a number of infectious diseases.

While the causative agents, whether visible or invisible, of

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some of the most important diseases have been discovered and identified, there is still a large number of diseases the causative agents of which are still unknown. There are, however, certain groups of diseases in which the causative microörganisms are doubtless known, since they are constantly found in the same disease, but their ætiological relation cannot be conclusively determined, chiefly because of the lack of adequate methods of isolating the suspected organisms. In other words, a pure culture of the organism is required. This was the situation with Treponema pallidum until I succeeded in producing pathological changes indistinguishable from human syphilitic processes by means of pure cultures of this organism. The search for the causative organism of syphilis had been made by a great many investigators. It was not, however, until 1905, when Schaudinn and Erich Hoffmann discovered a distinct type of spirochæta now known as spirochæta pallida, or Treponema pallidum, that an organism present in sufficient number in syphilis, and never in any other disease, became known to us. This remarkable discovery of Schaudinn and Hoffmann was rapidly confirmed throughout the world, and the presence of this organism in any lesion is accepted as the definite proof of syphilitic nature. In this connexion we must not forget the great service rendered by Metchnikoff and Roux, who had previously shown that the virus of syphilis is transmissible to certain apes and that it does not pass through the pores of a Chamberland filter. The latter fact is important to the investigator, since it shows the virus to be large enough to be seen under the microscope. In spite of the slight refractory property possessed by this organism, Schaudinn was able to see it without staining. He subsequently found a stain in Giemsa's solution, which brought a faint colour (hence called pallida) in fixed specimens. Metchnikoff and Roux next demonstrated this organism in the lesions experimentally produced in apes. Further progress was then made by E. Hoffmann, Buschke, Fischer, Tomasczewski, Bertarelli, Volpino, Levaditi, Uhlenhut, Mühlens, Neisser, Truffi, Mulzer, Flexner, Nichols, and many others, who not only succeeded in demonstrating the enormous number of Treponema pallidum in acquired as well as congenital syphilitic lesions and organs, but also in the tissues (chancre, orchitis, keratitis) of certain lower animals, such as rabbits, that have been inoculated with the human material rich in pallida. The result of these investigations was that the pallida was regarded as the cause of syphilis. The final proof of this, however, depended upon the ability to grow a pure culture of Treponema pallidum.

The pure cultivation of Treponema pallidum opens up many important problems in syphilis. By means of it, we can study the biological characters of the organism more closely and definitely, and investigate the phenomena of immunity and anaphylaxis which are most likely to develop during the chronic course of the disease in man. Since the discovery of the organism by Schaudinn and Hoffmann in 1905, numerous bacteriologists have attempted to cultivate it in artificial media, but no success was reported until 1909, when Scherschewsky announced that Treponema pallidum could be grown in a gelatinized horse-serum together with many other associating bacteria. This has since been confirmed by other investigators, who, like Scherschewsky, have all failed to isolate it. During 1909 and 1910 Mühlens reported that he obtained a pure culture from a mixed growth in Scherschewsky's horse-serum, having employed a mixture of horse-serum and agar for purification. Mühlens carefully stated that his spirochæta was morphologically indistinguishable from the pallida and produced a strong putrefactive odour in the culture. The appearance of growth was similar to that of the culture of spirochæta dentium. Mühlens' culture was absolutely non-pathogenic for monkeys, rabbits, and certain other laboratory animals. Continuing the work of Mühlens, W. H. Hoffmann in 1911 claimed to have cultivated five more strains of the same organism from human lesions by the same process. This investigator does not give any detail of the morphology or biology of his cultures except to state that they were identical in every respect with those isolated by Mühlens. He stated, however, that his strains grow even in plain agar without horse-serum. The cultures of Mühlens and W. H. Hoffmann are anærobic. While Mühlens could not produce any lesion with his culture, W. H. Hoffmann in his recent paper claims to have produced an orchitis in the rabbit with his cultures, a condition which he could not accomplish at the time of the publication of his first report. Whether this organism with the morphology of spirochæta pallida, easily cultivatable in a mixture of horse-serum and agar and capable of producing a fetid odour in its growth, is the real pallida or a spirochæta resembling the pallida merely in morphology, will be shown later when we discuss the mouth spirochætæ cultivated by me. In the meanwhile, Galasesco and Brückner in Roumania, and Sowade in Germany, succeeded in producing characteristic lesions in the rabbit by means of impure cultures of the pallida grown in Scherschewsky's horse-serum.

Independently of these investigators and employing entirely

different methods, I succeeded in 1910 and 1911 in obtaining several pure cultures of Treponema pallidum and one of Treponema pertenue (yaws) from the orchitis produced in rabbits by transmitting the spirochætæ from human cases. The reason for choosing the orchitis material of the rabbit was to exclude the possibility of cultivating another spirochæta resembling the pallida and confusing it with the latter. The orchitis material contains almost pure pallida and no other similar saprobiotic forms, such as the dentium, which must be taken into consideration when isolating the pallida from a chancre or condyloma in human cases. I will not describe here the exact technique for the pure cultivation of the pallida; I refer the reader to my papers on this subject. With six different pure strains of the pallida, I was able to reproduce typical orchitis in the rabbit. After familiarizing myself with the cultivated pallida, I proceeded to isolate the organism directly from human chancres, condylomata, and skin papules, the mouth lesions being avoided on account of the presence of the dentium which, as will be shown, is difficult to differentiate from the pallida in morphology. Thus far seven different strains of the pallida have been isolated and are kept growing in a pure state. The morphology and biology of these agree with those of the strains previously isolated from rabbit orchitis, and are found to produce characteristic lesions of the skin in certain monkeys. The Wassermann reaction developed also after successful inoculation.

The general characteristics of the cultivated pallida are: (1) strict anærobiosis; (2) requirement of fresh sterile animal or human tissue and serum (or ascitic fluid) in the culture medium for growth; (3) almost transparent, diffuse growth, seldom forming a discrete colony; (4) no coagulation of serum or tissue constituents; (5) no production of any putrefactive odour in growth; (6) optimum growth in a weak, alkaline reaction and at a temperature of about 37° C.; (7) beginning of growth after several days and its continuation for several weeks, majority of the organisms retaining their motility; (8) the presence of a long, straight, or finely curved, delicate flagella-like projection at one or both ends; (9) longitudinal division.

For comparative purposes I have also cultivated for the first time two different species of common mouth spirochætæ; namely, one heavier, and one delicate type, designated by me Treponema macrodentium and microdentium, respectively. The microdentium was known as spirochæta dentium (Koch) before cultivation, and the macrodentium bore no particular name, although it was called by

some authors medium form. Before their isolation in pure cultures, it was not known whether both forms were varying sizes of the same organism or two different species.

The most important of the two dentiums is the microdentium, because this organism is almost impossible to differentiate morphologically from the pallidum, and hence it might be confused with the latter. Only those experienced with both cultures may detect certain differences in morphology. On the other hand, nothing is easier than to pick out the microdentium from the pallidum when both are compared in cultural characteristics. The following points are sufficient to distinguish the two: (1) the microdentium grows more easily and rapidly and forms more discrete and denser colonies than the pallidum; (2) it is less strictly anærobic; (3) it produces a putrefactive odour; (4) it grows without the addition of a fresh sterile tissue to the media; (5) in an old culture the tissue, if added to the media, assumes a dark brown to blackish colour; (6) in a good growing fluid culture the serum water may be loosely coagulated after several weeks. The macrodentium is more easily differentiated from the pallidum by its irregular curves, peculiar vibrating motility, and its general appearance, although in growth it resembles the pallidum closely, especially as it produces no odour.

In view of these facts, one wonders how the so-called pallidum strains of Mühlens and W. H. Hoffmann can be distinguished from the microdentium with which they agree in every respect. Furthermore, their pallidum strains are entirely different from the author's in most fundamental, biological characteristics. This question is also raised by Erich Hoffmann in his latest work, in which he further points out that in any syphilitic organ containing enormous numbers of the pallidum there is no odour, hence the cultures of Mühlens and W. H. Hoffmann must contain, besides the pallida, certain spirochæta capable of producing the characteristic putrefactive odour. But, as their culture medium contains no fresh tissue and their strains continued to grow through numerous transfers, whereas no pallida can grow under the same conditions, it is doubtful whether their cultures contained any pallida. It is more probable that they have been dealing with the microdentium, or at least a spirochæta indistinguishable from it in cultural properties.

In order to use the pure culture of Treponema pallidum for advancing our knowledge in the study of syphilis, we naturally turn to the field of immunity and anaphylaxis. I will not discuss the question of immunity here, but I will limit myself to the phenomenon of local anaphylaxis, or allergy, as termed by von Pirquet,

who first discovered similar reaction in tuberculosis. Syphilis, like tuberculosis or certain other chronic infectious diseases, confers upon the patient a hypersensitive condition of the tissues, that is, a skin allergy is established after a certain period in the course of the disease. This condition is easily detected by introducing a small quantity of the devitalized pure culture of Treponema pallidum (luetin) into the epidermis. If the allergy is already present, the inoculation of the luetin is followed by a marked inflammation at and about the site of injection, comparable to von Pirquet's tuberculin test for tuberculosis. While referring the reader to the detailed report, I may state briefly that I found the allergic state of skin in syphilis to be present in almost every case of the tertiary stage and in a large percentage of latent and late hereditary syphilis. It was almost always absent in primary and very early secondary syphilis, in which stages this condition may be brought out by means of an energetic anti-syphilitic treatment. It is especially striking to observe the appearance of allergy in the cases of secondary syphilis after the injection of salvarsan. This is apparently due to the destruction of a large number of Treponema pallidum in the human body by this powerful spirochætocide and subsequent absorption of the pallidum substances by the entire system, including the skin. That this is true is shown by the fact that even rabbits can be made allergic through repeated injections of the dead or living pallida, as was demonstrated by me. Normal individuals or those suffering from non-syphilitic diseases never give the reaction.

The diagnostic value of the luetin test has its own sphere, as have other diagnostic methods. It does not give any reaction until the allergic state of the skin dvelops, but after its appearance it seems to persist until the probable eradication of the disease from the system, and remains uninfluenced by the ineffective treatment. In this respect the test appears to have a prognostic value, which neither the negative clinical symptoms nor serological examinations possess. During the late stage of syphilis, when visceral organs are affected, and the clinical and serological examinations yield no decisive diagnosis, the luetin test assumes an important position in determining the nature of the affection. In other words, the early stages of syphilis can best be diagnosed by the demonstration of the pallidum, by the clincal manifestations, and by the serological examinations; the late stages by resorting to the luetin test. I have met with a number of cases of hereditary syphilis in which, despite the strong serum reaction and extensive clinical manifestations, no luetin reaction was obtained. I consider these cases of a bad prognostic

character, as this only indicates that the disease is too severe to enable the patients to respond to the infecting agent by the development of allergy. Thus, it will be seen that the intensity of the infection is, with certain exceptions, in direct ratio to the severity of the clinical and serological manifestations; while the luetin reaction indicates either that the infection is well borne by the patients or that it is under a better control, due to the treatment. Thus it is natural to find cases with a negative Wassermann reaction, and positive luetin test, although both reactions are found coëxisting in many instances.

The above estimate of the luetin test is derived from my observations of several hundred cases, but its ultimate significance and proper utilization in practice will be demonstrated only through careful observations made by clinicians in different fields of medicine in the future.

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SALVARSAN: A YEAR'S EXPERIENCE

REPORT OF TWO HUNDRED AND FIFTY CASES

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INTRODUCTORY: In a previous communication before this society, with Dr. Adami, we reported upon twenty-six cases in which we had used salvarsan. Since that time we have administered the drug to an additional 221 patients, making a total of 247.

While barely a year has elapsed since we treated our first case, and while we realize that the last word on salvarsan, or indeed on any drug used in the treatment of syphilis, cannot be uttered before several decades have elapsed, the present moment seems opportune for detailing to the society the conclusions arrived at in the course of one year's work. Some illusions have been dispelled, but, on the other hand, many convictions, expressed rather timorously in the first communication, have been strengthened by our further experience.

Methods of Administration: Without going too much into detail as regards methods of administration, where one stands out so preëminently, it will suffice to say that there are three ways: (1). Subcutaneous; (2). Intramuscular; (3). Intravenous. The drug may be given as acid or alkaline solutions, and as neutral watery or oily suspensions. The acid solution is toxic, dangerous, and unjustifiable. The alkaline solutions may be given by any of the three methods, while the suspensions may be given subcutaneously or intramuscularly.

The subcutaneous or intramuscular methods, though possessing certain advantages, particularly the intramuscular injection of an alkaline solution, are followed by certain symptoms which render their use less desirable than the method of our choice, the intravenous. Salvarsan locally acts as a necrotic and Martius (Frank-

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furt) has shown that every subcutaneous or intramuscular injection is followed by more or less necrosis, which, if contiguous to important structures, may cause undesirable, even dangerous symptoms, as regards the comfort and life of the patient. Necrosis of the skin naturally occurs more frequently after the subcutaneous route, but does occasionally follow the intramuscular. These necroses are very refractory to treatment, and take considerable time in healing. Fortunately, owing to our early predilection for the intramuscular method (acting on the advice of Professor Flexner) and our early adoption of the intravenous method, we have had no superficial necroses.

The pain, which is an almost invariable symptom, is probably due to this irritative and necrotic action on nerve tissues, which action is responsible for the nerve paresis and paralysis, which occasionally occur. The pain, in one of our cases, persisted most severely for four weeks, owing to which the patient was unable to move about even in bed. Muscular disability from the infiltration and induration caused by the drug, may persist for long periods, and one of our patients, injected in January last, is to-day, nearly ten months later, unable to cross the affected leg over the other.

The great advantage claimed for these two methods is that an arsenical dépôt is formed, on which the organism draws. It has, however, been shown that after intravenous injection, far from the arsenic being excreted as rapidly as first observations seemed to show, arsenical dépôts are formed in the internal organs, so that the advantage applies equally to the intravenous method of administration. Our own experience of the two former methods and the much larger experience of the European workers was sufficient to convert us to the use of the intravenous method, which we have used exclusively since January, 1911, and in over three hundred injections. So much has the use of the intravenous method become universal that Finger recently quoted Ehrlich as saying that "606" should not be given unless it were given intravenously.

While the intravenous administration is the best, as regards the comfort of the patient and celerity of action, certain disagreeable by-effects are associated with its use. Our earliest cases showed a certain group of symptoms, fortunately of short duration, appearing almost immediately after injection, or delayed three to six or even as long as twenty-four hours. Rise of temperature, chill, nausea, vomiting, diarrhœa, headache, backache, and general malaise, were present in varying degrees in a majority of our cases, the severity of the disease or the amount of the drug seeming to have

no direct relation to the after-effects. With an improvement in technique these symptoms are being so reduced that the greater number of injections are now being given without any reaction whatever, and where symptoms are present they are much milder than formerly. Wechselmann (Berlin), whose experience reaches to over six thousand injections, has studied the question, and concluded that most of the after-effects were due to the presence of saprophytic organisms, dead or thermo stabile, in the distilled water commonly used in making up the salt solutions, and that they are, in fact, errors of technique.

TECHNIQUE: As has been remarked the intravenous method is followed exclusively by us and it may be advantageous to briefly describe our technique. Rigorous asepsis is a *sine qua non* in all the steps of the operation. The apparatus should be the simplest possible. There are two possible methods: (1) Gravity; (2) Syringe. Both have their adherents and as many complicated forms of apparatus and needles. The simplest, in our opinion, is the best. We have used the gravity method, and in its simplest form. A 300 c.c. cylindrical container, which may be held in an assistant's hand or attached by a burette holder to an upright, is the receptacle of the drug. To its lower, narrowed extremity is attached a rubber tube about four feet long, with a glass insert, six inches from the needle. The needle is a medium sized aspirating one, moderately sharp and with a short bevel. An artery forceps serves as a clamp for the tube. These, and all the glassware used in making the solution of the drug, should be previously carefully washed and sterilized by autoclave.

The drug should be given in a dilute alkaline solution, normal saline being the diluent of choice, not distilled water, in a quantity, 40 to 50 c.c. for every ·1 gramme of the drug. The saline solution should be prepared from freshly distilled water, using Merchk's NaCl. C.P., and then autoclaved. If the solution is to be kept, the flask must be carefully sealed.

The desired quantity of the drug is completely dissolved in 40 to 50 c.c. normal saline solution, solution being hastened by stirring with a glass rod. Solution being complete, sufficient 15 per cent. sodium hydrate solution (previously filtered and autoclaved) is added drop by drop to convert the acid solution first into a neutral precipitate, and secondly, the latter into an alkaline solution. Sufficient saline is added to make the total quantity conform to the rule given above. The temperature of the injected fluid should be about 105° F. Filter the fluid before injection.

The patient is placed in a recumbent position, a vein of the forearm or elbow is selected and placed in a good light. A bandage about the arm above the vein renders the vein more conspicuous. Clenching the patient's fist tightly and percussion of the veins are additional aids in bringing out a refractory vein. Thoroughly cleanse and sterilize the site of injection, alcoholic bichloride being better than iodine disinfection, as the iodine obscures the vein and blunts the needle. Now pour 50 c.c. saline solution into the container, see that the solution fills the tube and needle, that all air is expelled and there is no obstruction to the flow. Clamp the rubber tube, and insert the needle directly into the vein. This is possible in 98 or 99 per cent. of cases. Only in very fat people is it necessary to make a skin incision. The needle within the vein, test it by removing the constricting bandage and the clamp. A moment's observation will suffice. If the level of the fluid in the tube does not fall, or a swelling at point of injection results, remove the needle and try again, either on the same or other arm. Once the fluid runs satisfactorily, without any escape into the perivenous tissues, pour in the salvarsan solution, the container being elevated about three feet above the vein. Stoppage of the flow may be due to several causes; obstruction in the needle by blood clot, if back flow has resulted, or a wounding of the vein from the inside, resulting from unwary movements of the patient or operator with resultant perivenous infiltration. In the latter case, pain and swelling result. An obstruction in the needle may be removed by milking the tube. If infiltration is occurring the needle must be removed and a fresh vein selected. Such an accident should not occur, for it has all the unpleasant and painful features of a subcutaneous injection. All the fluid out of the tube, a few c.c. of saline may be given, the needle removed, and a sterile pad applied with pressure to prevent oozing from the vein and formation of a hæmatoma. Performed properly there are no local after-effects of discomfort.

Ambulant Treatment: It is advisable and preferable that the patient should be in bed and remain there for twelve to twenty-four hours afterwards. But the exigencies of an out-patient practice have led us to give intravenous injections *ambulant*. The patients, after the injection, are advised to go home at once and stay in bed for the rest of the day. During the past summer and fall, nearly two hundred intravenous injections have been performed in this way without any bad results.

Dosage: As a routine we have shown that for the adult male or female, a dose of ·6 grammes is well borne. Two and three

injections have been given to the same patients without any apparent sensitiveness.

CASES: To summarize the cases treated, there have been of,

I. Syphilis	26 cases.
II. Syphilis	131 "
III. Syphilis	48 "
Latent Syphilis	18 "
Cerebral Syphilis	7 "
Congenital Syphilis	2 "
Tabes Dorsalis	9 "
General Paresis	1 "
Psoriasis	2 "
Carcinoma	1 "
Sarcoma	1 "
Amœbic Dysentery	1 "

or 247 in all.*

One of the earliest illusions dispelled about salvarsan was the so-called *therapia sterilisans magna*. And at the outset we can state very positively that one injection of salvarsan cannot in the vast majority of cases be depended upon to cure syphilis.

Apart from this, our opinions as to the effects of the drug have not greatly altered. We have continued to note the same prompt disappearance from the lesions, when present, of the spirochætæ pallidæ, whose growth in pure culture and reproduction of syphilis in rabbits, if we accept Noguchi's work, fulfils the final postulate of Koch.

Particularly pleasing are the results in primary syphilis, treated before the outbreak of the generalized symptoms. Of our twenty-six cases, we have been able to follow nineteen. In eighteen, secondary symptoms were entirely aborted, while the nineteenth has not yet passed the time in which secondaries might reasonably appear. In two cases there have been recurrences in the site of the primary lesion, both cases where this was extensive and extremely indurated. One of these cases yielded promptly to a second injection, the other was injected in England with result unknown to us. These two instances of the difficulty of influencing densely indurated lesions are the strongest argument possible for the necessity of excising the primary sore, wherever its site renders this possible. We shall recur to this point in speaking of abortive treatment.

Of secondary syphilides, the mucous patches and condylomata have yielded promptly, with one exception—a case of ripe secondaries, which received an intramuscular injection of ·5 grammes in

*Since writing this we have injected eighty-four further cases, or 331 in all.

neutral suspension, one of our early cases. The macular lesions have disappeared rather slowly, while the papular lesions have shown themselves rather resistant, especially the larger, tougher ones. Pigmentation usually follows, disappearing very slowly.

Gummatous lesions have given very prompt results, except in large ulcerations of the lower extermities where other factors, varicose, circulatory, etc., have perhaps played a part. Nothing more striking has been observed than the rapid disappearance of the palmar and plantar syphilides, lesions notoriously resistant to mercurial treatment.

In striking contrast to the cases treated by salvarsan is a group of cases in the genito-urinary clinic of the Montreal General Hospital, treated in the chronic, intermittent manner with mercury and potassium iodide for the past two years. While, of course, many of these are under control, there are not a few who still have small resistant lesions even at the end of two years. Some of the severest of these have been selected for salvarsan injection, and are among our most striking successes.

Tabes Dorsalis: Neither in tabes nor general paresis can we look for much improvement of a permanent nature. In tabes we have seen a temporary improvement in one or two. One, who from his ataxia was unable to perform his ordinary labours, was comparatively well for months, but has again relapsed.

Cerebral: Cerebral syphilis has shown us some brilliant successes. One woman had been ill for a year: headaches, vomiting, double vision, dizziness, slowness of speech, dulness of intellect, and fainting attacks. On her admission to the hospital in June last, in the service of Dr. Lafleur, she was in a very dangerous condition, with incontinence of fæces and urine and a double specific choroido-retinitis. An injection of ·5 grammes salvarsan intravenously brought about a marvellous change, and the patient was discharged a month later, feeling quite well, free from headaches, dizziness, and vomiting. Another, a hemiplegic man, in Dr. Finley's service, is to-day, eight months after, working as a coal carter, carrying one hundred pound bags of coal up three flights of stairs, and his only complaint is of being a little out of breath at the top. In one moribund case, death followed in two days, apparently from pneumonia. This is our only death in the series, but it ought not really to be debited to the drug.

Congenital: In congenital syphilis, two cases have been treated, both with chronic osteitis, suffering from severe pains. These have been free from pain eleven and twelve months, respec-

tively. One had an interstitial keratitis which cleared up after the injection.

EYE: As to the value of salvarsan in eye conditions, our experience has been too limited to speak authoritatively.

RELAPSES: Of seventy cases of primary, secondary, or tertiary syphilis, which we have been able to follow, seven have relapsed, in two cases after two injections, in five after one only. It has been difficult to keep in touch with all the cases, and it may be that all of the relapses have not returned to us. They all belonged in the very early period of our work with salvarsan, at a time when we were perhaps still exulting in the illusion of a *therapia sterilisans magna.* Now, with the disillusionment, we are attempting to anticipate the relapses by repeating salvarsan treatment. Comparing corresponding results under mercurial treatment, even if the immediate symptomatic improvement had been as marked, which one would hardly expect, the relapses after one or even more courses of mercury are greater in number and severity.

NERVE RECURRENCE: Most important, from the critical standpoint of salvarsan, is the much discussed "*neuro-recidiv*" or nerve recurrence, that is to say, the occurrence of a nervous lesion, generally in certain cranial nerves, particularly those of the eye and ear, usually in secondary cases, four to six or more weeks after the injection of the salvarsan. Nearly all are agreed that the lesion is a syphilitic one, the point at issue is the part played by salvarsan in their causation. A section of the Vienna school, led by Finger, has made a rather strenuous attack on salvarsan, alleging that these nerve recurrences are more frequent than in the days of mercurial treatment, and are so dangerous as to contra-indicate the use of salvarsan except in mercury resistant cases. Mucha, in a recent report from the Finger clinic, groups all the cases with any suggestion of a nerve recurrence and finds they number 10 per cent. in their series of five hundred.

Ehrlich asserts that these lesions are caused by isolated nests of spirochætes which have escaped the action of salvarsan, and by reason of the anatomical disadvantages of the part, e.g., nerves passing through long, bony canals, are *loca minoris resistentiæ;* are, in fact, syphilitic recurrences, demanding continued antisyphilitic treatment. Further, Benario has studied the records of a large series of cases, and finds that these syphilitic nerve recurrences were as frequent after mercurial treatment. Wechselmann (Berlin) and Fehr assert that 2 to 3 per cent. of all early secondaries show eye lesions, not necessarily noted by the patient. The unusual

prominence given to the question results from the more searching examinations given to salvarsan-treated patients, with the result that the syphilographer is gleaning information about the special senses, formerly only appreciated by the specialists in those departments.

In this series of two hundred and fifty cases, there are only two which can be looked upon as nerve recurrences. One of double optic neuritis, with opacities in the vitreous appearing four weeks after an intravenous injection, and one of unilateral facial paralysis appearing about three months afterwards. In the first case the lesion was not remarked by the patient, and was treated by a second intravenous injection, with result, unfortunately, unknown. The facial paralysis improved spontaneously. She has had a second injection and is now free from signs.

Two of the cases had an optic neuritis at the time of the first injection. One was a secondary case treated in the clinic with eight mercurial injections; the other was a fresh, untreated case.

An interesting sidelight on the controversy is furnished by the Jarisch-Herxheimer symptom, first noted after mercurial treatment, of which we have observed several cutaneous instances. This has been noted in connexion with the nerves of the eye and ear, when a lesion flares up immediately following treatment, only to subside after a transient course. If we are to regard the Jarisch-Herxheimer phenomenon as a congestion of a focus containing spirochætes, then the true syphilitic nature of the nerve recurrence is something more than merely probable. In any case, our own results are in accord with those, like Wechselmann with his experience of over six thousand cases, who found nothing to contra-indicate the use of salvarsan.

Two cases of herpes zoster have been observed following the use of the drug, and numerous cases of herpes labialis. Jaundice followed in two cases. In two pregnant women, the drug was given without causing any disturbance; one of these has recently given birth to a healthy child, with a negative Wassermann reaction.

The effect of salvarsan on the Wassermann reaction does not differ materially from that of mercury. If anything it is stronger. The positive reaction becomes negative in an average time of about six weeks. Looking upon the Wassermann reaction as a symptom of syphilis, we are not surprised to find relapses preceded or accompanied by a change of a negative into a positive reaction. It is our intention to go into the subject of the Wassermann reaction in a following communication. Here the details would lead us too far afield.

Coming to the all important matter of treatment, it is a little difficult to be dogmatic. At the outset, we wish to lay stress upon the necessity of diagnosing syphilis early. With the discovery of the spirochæta pallida to aid us, there is no reason why the initial lesion should not be diagnosed long before the outbreak of secondary symptoms. The treatment of syphilis cannot be commenced too early, and if abortive treatment is to be successful, early diagnosis is an absolute *sine qua non.*

Our own experience has led us to adopt a certain routine. All cases receive an immediate intravenous injection of salvarsan, repeated in from two to three weeks. In primary cases, in addition to this, we advise the excision of the sore, where this is anatomically possible, where impossible, the institution of any local treatment which favours a free circulation through the whole lesion, in order that all the spirochætes may be rendered accessible to the drug. Measures to be recommended for this purpose are curettage and hyperæmia by arterial or venous congestion. Further than this, the course of treatment must be largely expectant, depending upon clinical signs and the behaviour of the Wassermann reaction. Should clinical signs or a positive Wassermann reaction persist, treatment must be continued. Should clinical signs appear at any time or a negative Wassermann reaction become positive, treatment must be instituted. For ourselves we would unhesitatingly recommend a continuance of salvarsan. There is, however, no objection to combining mercurial or potassium iodide treatment with salvarsan. Our own experience, and that of others, I may add, has shown that the three remedies are not imcompatible; some have even claimed that the action of one or the other—we are speaking particularly of salvarsan and mercury—renders the spirochæte more amenable to the influence of the other.

Whatever the future may show, we are agreed that the Wassermann reaction must be regarded as a symptom of syphilis and combatted as such. For the same reason, and particularly in the later stages of latent syphilis, the Wassermann reaction must be looked upon as our most valuable adjunct in the treatment of syphilis.

Salvarsan has been shown to be particularly valuable in cases which resisted mercury. Further, the symptomatic improvement after salvarsan is more marked than after mercury. This fact alone in rendering virulent syphilitic lesions innocuous, is a matter of immense social value to the community.

The advent of salvarsan in no way releases us from the respon-

sibility of keeping our patients under surveillance for two to three or more years. For some cases, doubtless, the rules formulated by the master syphilographers, Fournier and Jonathan Hutchinson, are too severe, especially when a primary lesion may be diagnosed even on the day of its appearance and treatment instituted forthwith. For other cases the limits of four and five years may have been insufficient.

While we have outlined an expectant treatment depending on the Wassermann reaction, it is not improbable that the future may demand a return to an intensive, chronic, intermittent treatment, with salvarsan alone, or salvarsan and mercury combined. There is no doubt that in the present state of our knowledge this is the safest course.

While we look to the future very optimistically, we must, as far as salvarsan is concerned, feel our way and proceed very cautiously, that false hopes and vain illusions may not be followed by deep and lasting regrets.

GASTRIC CARCINOMA

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GASTRIC carcinoma, one of the most formidable of all internal maladies, is, in this portion of the continent at least, steadily on the increase. In order of frequency, it stands second only to cancer of the uterus. There is to-day probably no pathological lesion so fatal in its ultimate results, which, at the only time when any hope of recovery can be offered, presents such difficulties in diagnosis. Many a doom is sealed before the patient becomes aware that there is really anything serious the matter. The proof, however, which is fast accumulating day by day, that in at least a great majority of cases, the seed bed of gastric carcinoma is the indurated edges of an old peptic ulcer, is shedding that ray of light which may enable us more frequently in the future to discover and radically remove this dread disease while yet there is time to effectually save life. One thing is certain, that when carcinoma in this region is discovered and radically removed in the early stage, life is saved. To be diagnosed before metastasis commences to produce involvement elsewhere, is to-day the acme of internal diagnostics, and the physician making such early diagnosis does more to save the life of his patient than the surgeon who effectually removes the disease.

Much practical knowledge has been gained through laboratory research, but even more has been achieved by clinical and surgical methods. Surgery has conclusively taught us that at least some of the predisposing conditions may be effectually removed, and by thus operating during this precancerous state, usually a typical history of long-standing ulcer, the development of the cancerous state may be prevented.

Such, indeed, is one of the various results aimed at in operation for the radical cure of gastric ulcer, but the day has not yet arrived when the diagnostician may determine which ulcer is likely to degenerate into cancer, and which not. In the meantime, we must strive to so improve our diagnostic methods that we may speedily reach the time when all gastric carcinomas may be discovered and removed at a time when practically all lives may yet be saved.

Symptoms: In obtaining the history of patients suffering from gastric carinoma, three distinct types may be elicited:

1. Those with a history of intermittent stomach trouble,

which may have covered many years, or been of much shorter duration.

2. Those with a long history of constant gastric disturbance.

3. Those who have, heretofore, enjoyed the best of health, and whose present illness attacked them unawares, without the slightest previous warning.

The first type of history is by far the most common,—the typical, clinical condition presented by the long-standing, chronic, gastric ulcer. Many patients, especially in the later stages of carcinoma in this region, present a typical facial expression very significant of this disease. The presence of this dread malady may indeed be frequently foretold by this typical facial expression. Pallor about the mouth and nose, the face wan and thin, the eye anxious and penetrating in an endeavour to read the opinion of the physician, all combine to give that pinched look, its chief characteristics.

The mental attitude, as thus depicted in the features, is one of hopelessness. The patient is apparently possessed of the idea of impending danger, and is usually resigned to his fate, presenting the appearance of calm dejection. Weight is lost rapidly, a feeling of lassitude and extreme weakness pervades, and anæmia quickly develops. There is often a sickening pain in the region of the epigastrium, or rather the feeling of a strange, indescribable distress which may or may not be directly referable to meals. The fears of the patient, as portrayed by the anxious expression so frequently seen, are well grounded, for in every case when cancer has once developed in the stomach, the condition is one of utter hopelessness unless relieved by early surgical intervention. In the absence of such intervention, the progress is steadily downward, with seldom any recession in its progress.

The symptoms of gastric carcinoma will very frequently cover many years, from the earliest commencement of the precancerous state to the fulmination of the disease, cancer itself. This early history may be conveniently divided into three, separate stages. The first stage is marked by a particularly good appetite, the presence of pain from two to four hours after meals, a feeling of excessive acidity, as manifested by an increasing bitterness in the mouth, and finally an occasional belching of gas and sour eructations. These symptoms will disappear entirely, and for some time the patient will enjoy the best of health, and so complete may be the apparent cure that he may even entirely forget he has had any stomach disorder at all.

After several such attacks, or perchance a period of quiescence

for a longer or shorter period, the second stage is ushered in. It is practically a repetition of the first, only in a more aggravated form. The vigorous appetite, so noticeable at the earlier period, has somewhat disappeared, the keen relish for food is lost, and the pain, so noticeable before, now appears much earlier after meals and in a much more intensified form. Gas and sour eructations are common, and for the first time appears the vomiting of sour, bitter, acrid material, often containing food particles. This vomiting is invariably followed by a sense of great relief, so much so, that many patients resort to the use of the stomach tube in order to obtain the same relief from distress. Loss of weight now commences to appear, though at the culmination of this present attack the lost flesh is rapidly regained.

The third stage is but a further aggravation of the former symptoms, and may only appear after several attacks such as that just noted. It is marked by a rapidly decreasing appetite, and in many cases an absolute fear to partake of any food at all, so great is the distress occasioned afterwards by the pain, gas, sour eructations, bloating, and vomiting. The period of relief produced by food becomes much shorter. The obstructive symptoms are now, as a rule, well marked. As the patient passes from one stage to the next, constipation gradually becomes more obstinate. Blood appears for the first time in a test meal.

The transformation from the third stage to the presence of cancer is extremely difficult to determine. It is when this period is more easily read that more lives will be saved, for it is the signal indication for immediate operation. Stage three is still ulcer; stage four dread cancer. Any peculiar marks of differentiation between stages three and four are exceedingly difficult to locate. The regurgitation, so acid and bitter in the earlier stages, loses to a great extent its apparent acidity, but becomes much more copious. Vomiting is excited more by liquid food, in this later stage becoming intensified, irregular, and copious. The vomitus also contains much more frequently large quantities of blood partly digested, thus presenting the classical symptom of "coffee ground" vomiting. Gas and bloating persistently increase the patient's discomfort. Pain, which heretofore, was periodical, now becomes much more constant, is of a dull, heavy, sickening character, is less localized than formerly, and will not so readily yield to pressure or the partaking of food. As cancer progresses the pain becomes more diffuse.

The whole composite picture is one which cannot fail to impress. The pale, anxious features, the pinched expression and languid air, the rapid loss of flesh, the character and persistence of the

pain and vomiting, all combine in impressing the fact that the stage of ulcer has passed and cancer has at last fastened its hold upon the stomach.

A complete examination of the stomach contents should invariably, and in some instances repeatedly, be made, for therein may lie much confirmatory evidence concerning the presence of cancer. The secretory activity of the gastric glands is determined by microscopic and chemical tests of samples of stomach contents obtained at the height of digestion. The time required for the digestive process to reach its height will depend entirely on the quality and quantity of the test meal administered. An ordinary full diet of meat and vegetables will require much longer than a simple one of readily digestible foods. Should vomiting chance to occur at the correct time, the vomitus may be utilized instead of obtaining the stomach contents in the usual manner through the stomach tube, but it is so rarely that vomiting is induced just when the process of digestion is at its height, that it must never be relied on. Then again, the act of vomiting may be the result of some disturbed condition of the stomach, rendering the contents chemically different, and thus producing in the tests a condition entirely foreign to the actual. It is, therefore, always better to employ some form of test meal for the purpose of obtaining samples of the stomach contents, from which accurate examinations may be made.

The best results and the most accurate tests can usually be made after a considerable fast, therefore the morning should be chosen for the administration of the test meal. Some clinicians are in the habit of employing a thorough, gastric lavage before giving the meal, but in the majority of cases a fast over night will produce equally good results. In cases of well-demonstrated pyloric obstruction, however, lavage will be of material benefit by removing all undigested food particles. Any food particles remaining in the stomach twelve hours after any meal may be regarded as positive evidence of pyloric obstruction.

Probably the best known and most convenient meal, and one which is almost universally used throughout America, is that recommended by Ewald and used exclusively by him in his clinic in Berlin. It consists merely of a slice of stale bread and three quarters of a pint of weak tea without either milk or sugar. Such a meal as this will usually have reached the height of digestion in one hour, and it is then it should be removed by stomach tube for analysis.

But one other test meal, that of Boas, is used at all extensively. This is a non-lactated one, and given for the purpose of demonstrating the presence of lactic acid in suspected cases of cancer of the

stomach. Before giving this meal, Boas advises the washing out of the stomach at bedtime in order to remove all traces of food, then, on the following morning, give from six to eight ounces of thin, though well cooked, oatmeal porridge, served without either milk or sugar. As in the case with the Ewald breakfast, this is removed in the usual manner in one hour. In devising this meal the contention of Boas was that ordinary food, such as bread or rolls, would contain enough milk to contaminate the future stomach contents with lactic acid.

Originally the contention of Boas was that the presence of even a small amount of lactic acid, be it ever so small, was strong evidence in favour of the presence of cancer, but this has on many occasions been proven incorrect. The presence, however, of a large amount of lactic acid, when not introduced with the food, must be admitted as strong evidence of the presence of cancer. By any of the ordinary tests, lactic acid cannot be demonstrated in the presence of free hydrochloric. Apart from the presence of carcinoma, the only condition likely to produce an excessive amount of lactic acid is one of those exceptionally bad forms of gastric catarrh producing stagnation with its accompanying excessive fermentation.

No diagnosis should under any circumstance be based on the result of the findings of one test meal. Several meals should be given and the results compared. For example, a person who has been in the habit of eating a large breakfast, probably consisting of a beefsteak, fried potatoes, one or two slices of bread, and a cup of tea, will be much more likely to have an excessive amount of H.C.L. when he partakes of a paltry Ewald breakfast. If, however, this meal should be given repeatedly, for at least three times, a fairly accurate result may be obtained. It is also a well-known fact that some persons habitually secrete more H.C.L. in the morning, others in the afternoon or evening, so that it becomes necessary, in order to reach the most intelligent opinion, to make tests at different parts of the day, and on the combined results to form conclusions.

In the majority of cases of gastric carcinoma there is early absence of hydrochloric acid. There was a time when this absence would be regarded as almost pathognomonic of cancer, but this is not now the case, and the knowledge of its absence is only of value when considered in conjunction with other symptoms. The absence of hydrochloric acid is only one of many symptoms which must be considered in conjunction, when determining the diagnosis in each individual case.

Although free hydrochloric acid is almost invariably absent in carcinoma of the stomach, even in its earliest stages, yet its absence

can be considered as no more than a suggestive symptom. Various other conditions will also provide such an absence, hysteria, neurasthenia, some cases of chronic gastritis and pernicious anæmia. It is even possible in some instances for H.C.L. to be entirely absent at one examination, and to be present even in excess at another some days or even a few hours later. A variation such as this, however, could only be accounted for by the exertion of nervous influences.

Even although free hydrochloric acid is usually absent at an early stage in the development of gastric carcinoma, yet it must be borne in mind that malignancy will, and frequently does, originate and develop in the presence of free H.C.L., sometimes even when this H.C.L. is being secreted in an excessive amount. The presence of hydrochloric acid must never be taken to indicate the absence of cancer.

The absence of hydrochloric acid in the gastric secretions may indicate the development of malignancy elsewhere. Some observers have found it almost as uniformly absent in cancer of the other organs, as where the stomach was involved. In gastric carcinoma the secretion of hydrochloric acid is always restored as soon as a portion of the stomach is resected, and very frequently so by free drainage of the stomach as accomplished by gastro-enterostomy in those cases in which the disease has progressed so far as not to permit of effectual removal.

The existence of gastric carcinoma is strongly emphasized by the constant presence of lactic acid in an excessive amount. True it is that other conditions will produce lactic acid, but seldom will its presence be constant or in excessive amount. Any obstruction to the pyloric outlet stasis, and consequent fermentation, will foster the presence of lactic acid, and as from 80 to 90 per cent. of such cases of obstruction are caused by carcinoma, the presence of lactic acid speaks strongly for its existence. Its absence, however, is no proof of the absence of cancer.

The Oppler-Boas bacillus, first described by Boas and later by Oppler, is usually found in the presence of constant lactic acid. Lactic acid is never present in free quantities until after the complete disappearance of H.C.L., consequently the bacillus just mentioned is never found in the presence of free H.C.L. The presence, therefore, of the Oppler-Boas bacillus is of doubtful value from a diagnostic standpoint, as its presence is rarely demonstrated until late in the disease, when practically all hope for cure has vanished.

Enlargement of the left supraclavicular glands is likewise a late indication of the presence of gastric cancer, and also is usually

an indication that the disease has already progressed too far to permit of any radical removal.

Blood in the stomach contents is a valuable sign in diagnosing gastric carcinoma, especially when considered in conjunction with other symptoms. Persistent occult bleeding, especially when associated with defective secretion and motor insufficiency, as demonstrated by the retention of gastric contents, is strong evidence in favour of cancer, while persistent absence of blood from both the stomach contents and feces, may be used as evidence against its existence.

The motor function of the stomach remains in many instances unimpaired until late in the disease. In testing for motor insufficiency, the test meals should be administered under identical conditions, and the stomach invariably washed out after the withdrawal of the meal, to make certain that all food particles have been removed.

A more valuable sign in the early diagnosis of gastric cancer is the albumen test, as practised by Dr. Kuttner, for many years Ewald's first assistant at his clinic in Berlin. He emphasizes this albumen test, if positive, as absolutely pathognomonic of cancer, and in those cases where it appears early it is invaluable.

The plan employed by Kuttner is to give the patient a full fluid meal, devoid of albuminoids, in the middle of the day, and then in the evening to thoroughly wash out the stomach. On the following morning this fasting stomach is washed out with twelve ounces of normal saline solution, and the syphonage tested for albumen with Esbach's fluid. If a flaky precipitate and opalescence supervene, the test for albumen is positive, and the presence of cancer definite. In a very large experience Kuttner has never known this test to be positive except in the presence of cancer. In many cases, however, this test does not become positive until late in the disease, when it must be classed with many other positive signs which are too late in appearing to be of any practical value. The test, however, should never be omitted, because it frequently happens that it is positive at an early stage in the disease, and consequently becomes of inestimable value to the patient.

Aside from the albumen test, there is no symptom which may be absolutely relied on as pathognomonic of cancer of the stomach, and as this so frequently does not give a positive reaction until late in the disease, it may be said in truth that the diagnosis must always be made on general symptoms, such as cardiac or pyloric obstruction, adhesions of the stomach to neighbouring organs, gastric stasis, etc., and these in turn are frequently so insidious in origin

as to arouse no suspicion until the time has passed when effective removal can be carried out.

Differential Diagnosis: Of the surgical diseases likely to be mistaken for cancer of the stomach, gall-stones with their accompanying complications, such as duct obstruction, infections, adhesions, or pancreatitis, are the most prominent; while large saddle ulcers, hour-glass contraction, or even pyloric obstruction due to ulcer cicatrization, are more easily differentiated. Duodenal ulcer, because of its typical, clear-cut symptoms, is not likely to be confounded with cancer.

Gall-bladder disease, with its various complications, is the source of the greatest difficulty in differentiation. In the late stages of disease due to gall-stones, the stomach symptoms are so truly characteristic of malignancy as to thwart even the most expert in arriving at an accurate diagnosis. The early history of the case in these instances must invariably be relied on in solving the difficulty. If the early history reveals the presence of sudden, severe attacks of epigastric pain, radiating under the right shoulder blade, such attacks ceasing as suddenly as the onset, and being in no way related to the partaking of food, the present trouble will usually be found in the gall-bladder. The early history must invariably be relied on to clear up the diagnosis, and will frequently be the means of preventing an otherwise excusable error.

In extensive saddle ulcers, or marked hour-glass contraction, the clinical picture is frequently one as though stamped with malignancy. There is often that emaciation and cachexia so significant of carcinoma. Hæmorrhages are sometimes frequent, and may even present the coffee-ground appearance so typically characteristic of cancer. In a condition such as this, we may even have a complete absence of hydrochloric acid and the presence of lactic acid with the Oppler-Boas bacillus, so frequently considered as positively significant of cancer.

In differentiating between such extensive ulceration and true cancer, one must remember that in ulcer the appetite remains good until quite late in the disease, and the loss of flesh and strength is consequently slow. In cancer the appetite is lost early, and rapid emaciation supervenes. In cancer the pain is more diffuse, is more constant and depressing, and not so closely related to food. If a movable tumour of the stomach be discovered with the presence of lactic acid and the Oppler-Boas bacillus, and the absence of hydrochloric acid in a test meal, cancer may, with comparative safety, be diagnosed.

The following table indicates the differential diagnosis:

GALL-STONES	GASTRIC ULCER	DUODENAL ULCER
PAIN: The pain in gall-stones is sudden, sharp, severe, and intense. It commences in the right hypochondrium and radiates to the right shoulder blade. It appears without the slightest warning and disappears just as suddenly. These seizures have no relation whatever to the injestion of food, and are frequently accompanied by chills, fever, and sweats. Should a stone be occluding the common bile duct, periods of jaundice of longer or shorter duration will frequently follow the attack of pain.	Is present in most cases, but is much less excruciating than in gall-stones. It radiates from the epigastric region to the left shoulder blade. It is increased by the injestion of food. The location of the ulcer may be partially determined by the period elapsing between the injestion of food and the commencement of the pain. If along the lesser curvature, pain appears in from one-half to one hour. If in the pre-pyloric region in from one to three hours.	The pain of duodenal ulcer appears in cycles ranging in time from a few days to several months. It is of a burning, gnawing character, and may be described as a "hunger pain," always appearing from two to four hours after meals, when the stomach is becoming empty. It is invariably relieved by food. An ulcer in the immediate pre-pyloric region will exhibit the same symptoms as one just beyond the pylorus.
VOMITING: Frequently accompanies the intense pain, and usually gives relief. Is of a greenish colour and intensely bitter.	Is usually a prominent symptom. Occurs from one to four hours after a meal, according to the location of the lesion. These vomiting spells are usually accompanied or followed by distressing eructations of gas.	Nausea and sour eructations are prominent symptoms from the first, while vomiting in the later stages is always present. Commences as a rule from two to four hours after a meal, though in some cases will appear only once a day, or perhaps only every second or third day. Gas formation is typical of ulcer either just beyond the pylorus or in the immediate pre-pyloric vicinity. Is invariably relieved by food for a period of from two to four hours.

GALL-STONES	GASTRIC ULCER	DUODENAL ULCER
HÆMORRHAGE: Rare—and if present, is only accidental.	Probably 60 per cent. of all cases of gastric ulcer have hematemesis, which in the acute round variety is frequently fatal. Hematemesis is, strictly speaking, not a symptom, but rather a late complication.	Many cases of duodenal ulcer suffer from sudden, severe fainting spells, to be followed almost immediately by blood in the stool (melæna). In this condition the stools have a tarry appearance. Microscopically blood is much more frequently found in duodenal than in gastric ulcer.
STOMACH CONTENTS: Usually normal.	Usually an excess of hydrochloric acid. Blood may be frequently found microscopically.	As in gastric ulcer, hyperacidity is frequently marked. Blood is not usually present in stomach contents, but may be discovered in the fæces.
TENDERNESS: During or immediately after an attack, tenderness is frequently marked in the right hypochondrium. Muscular rigidity is also often present.	Is usually quite marked in the epigastrium. Is sometimes diffuse, though usually quite definitely localized.	If tenderness is present it will be found to the right of the median line. Is marked, however, only in the presence of localized peritonitis.

The treatment of cancer of the stomach is essentially surgical. True it is that many, anxious for surgical relief, must be refused because of the extensive proportions to which the disease has already advanced; there are also many patients who refuse operation. These two classes must be treated palliatively. To the other class, those whose diagnosis is made at a comparatively early period, while yet there is prospect of cure, and who are willing to undergo the risks of operation, surgery will, indeed, offer good prospects for a long lease of life. Surgery offers the only hope of cure, and the great problem before the medical profession to-day is to evolve some means of arriving at an early and accurate diagnosis, so that surgical intervention may more frequently be instituted at such an early period as to ensure the saving or prolonging of many useful lives. To the man who may thus evolve such a method of early and accurate diagnosis, the world will indeed owe one of its greatest debts of gratitude. To recapitulate:

1. Cancer of the stomach begins as a purely local affection. At first it is confined to the part in which it begins to grow.

2. If removed at an early period it can be cured.

3. Unless removed early, it can only end in death.

4. Cancer is often present without pain. In some cases pain appears only in the later stages of the disease.

5. Ulcer of the stomach predisposes to cancer. In a great majority of all cases of gastric carcinoma, the seed bed can be shown to be the indurated edges of an old peptic ulcer.

6. The best time to effectually attack the disease is in the precancerous state—the ulcer stage. Thus by prevention, rather than by cure, will the greatest triumphs in the treatment of this disease be attained.

CLINICAL AND PATHOLOGICAL NOTES UPON CERTAIN SUB-TROPICAL DISEASES

By Fraser B. Gurd, B.A., M.D., Montreal

THE following paper has been prepared, not in order to add to our general knowledge of diseases met with in sub-tropical climates, nor will an attempt be essayed to describe in detail any of the conditions peculiar to the more southern latitudes. It is hoped, however, that a brief review of certain of the more important diseases prevalent in the southern United States, but which, of necessity, are more or less unfamiliar to physicians practising in Canada, may be not without interest to the members of this society.

For the most part, the disease conditions present in Montreal are also active as cause of disability and death in the south; similarly the reverse is also true. Unfortunately the majority of infectious agents are only too potent to induce their specific pathological processes with but little respect for climate or altitude; advancing age, moreover, is accompanied by the same types of degeneration, as evidenced by the development of interstitial nephritis, arteriosclerosis, etc., no matter upon which parallel the life of the individual be passed.

The percentage incidence of different diseases does, however, vary to a greater or less degree in different latitudes. Such variations are influenced directly by factors such as heat and humidity, which are essential characteristics of those latitudes nearer the equator, and others which are more or less accidental and depend largely upon different modes of life. For practical purposes it is difficult to separate the direct and indirect influences. It is possible, however, to consider the effects of these factors: first, upon the human individual as affecting his power of resistance; and, secondly, upon the various agents which are directly responsible for the propagation of diseased conditions.

As is well known, most pathogenic microörganisms, whether bacteria or protozoa, thrive and retain their vitality best at a temperature approximating that of the human body, and inasmuch as the climate nearer the equator is characterized by a higher temperature than it is farther north, being, in the case of the Gulf states,

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but a few degrees below blood heat during the greater part of the year, the danger arising from the life of pathogenic organisms outside the body is increased, as a result chiefly of the contamination of food-stuffs, more especially green vegetables, milk, and water.

In general, it appears that the physical well-being of individuals dwelling in warm climates is but little influenced by the higher temperature, in so far as disease and shortness of life is concerned. There is, however, a condition of physical and mental lassitude developed which has resulted in inhabitants of tropical countries being, for the most part, less alert and energetic than the more northern peoples. On account of certain features of life in the tropics, individuals although exposed, for reasons given above, to greater danger of infection, are in many respects better able to protect themselves against the onset of many diseases. Directly and indirectly the protective powers of the body are influenced favourably by the following factors: the absence of intense cold and the balmy climate, which persists during the whole year, make life in the open air more pleasant; we find, therefore, that the people are out-of-door dwellers for the greater part of each day and are easily able to ventilate their houses and sleeping quarters. As a result, tuberculosis, even among the negroes, is neither so widespread nor so active as it is with us. The open-air life and the absence of hardship and exposure, such as is so common during our winter months, diminishes also the relative number of infections of the respiratory tract, such as tonsilitis, lobar pneumonia, etc., resulting from streptococcic and pneumococcic invasion.

In addition to the beneficial effects resulting from a sufficient supply of fresh air, and the absence of rigorous winter weather, the ease with which the poorer classes are enabled to obtain an abundant supply of food results in fewer cases of those diseases which attack the ill-nourished. The climate and the soil of Louisiana both render the practice of horticulture so easy that no one need be destitute. The use of rice and corn as staple articles of diet reduce to an important degree the cost of living among the poor.

As a direct result of the higher temperature, the secreting power of the kidneys is conserved, the skin performing a large part of the excretory function. The average age of onset of chronic cardio-renal disease of simple origin is thus greater than it is in our own climate. Although higher mean temperatures foster to an important degree the capacity of pathogenic microbes for harm, proper hygienic measures will result in a tremendous decrease in the number of cases of illness and death resulting from bacterial and

protozoan infection. Inasmuch, also, as the activity of pathogenic microörganisms in the warmer climates is greater than in our more northern latitude, it is to be expected that such measures for the protection of public health will be initiated more thoroughly there than here. For years past, indeed, the danger resulting from the pollution of water has forced the southerner, in many places, to employ only rain water for drinking purposes. The success of such a procedure is nowhere better shown than in the comparative absence of typhoid fever in towns in which this method prevails. The filtration systems which have been installed, such as the one in New Orleans, have also proved eminently satisfactory in this respect.

Several facts of interest cannot fail to impress the student of medicine from the north, if he observe the relative frequency of certain diseases in the southern United States as compared with the north. As mentioned above, tuberculosis, despite the lax personal habits and ignorance of the negroes and the poorer whites, is much less prevalent than among ourselves; typhoid fever and bacillary dysentery also are encountered much less frequently than might well be expected, were it not that preventive measures are enforced more or less adequately.

In certain districts, too, and this is the case in New Orleans, malaria is a comparatively uncommon affection. This practical eradication of malaria in New Orleans occurred as a by-product, resulting from the campaign undertaken against the mosquito at the time of the yellow fever epidemic in 1905. At this time the anopheles, as well as the stegomeia, were largely exterminated, and, although both types of mosquitoes are again present in large numbers in the city, they have but little chance of becoming infected. Acute malaria is, therefore, comparatively infrequent in New Orleans. Chronic æstivo-autumnal cases are, however, not unusual, the patients being bitten, as a rule, in the country and coming into the city already infected.

It may not be without interest, in this connexion, to interpose a note relative to one characteristic of the stegomeia, which renders the control of yellow fever comparatively simple. This tiny mosquito will not cross an open space equal to the width of an ordinary thoroughfare unless carried upon some individual. The disease, therefore, can be readily controlled by isolating single blocks of houses and screening those individuals suspected of being diseased, so that the stegomeia cannot become infected. A careful attack upon the mosquitoes themselves and their breeding places soon causes the disappearance of the disease.

Of the diseases met with in Louisiana which are common to all climates and countries, syphilis is, probably, the one which is responsible for the greatest morbidity, not only among the negroes but also among the whites. It would appear that not only is syphilis more prevalent but that in southern countries it is a more virulent disease and shows less tendency to remain latent. I have notes of over eight hundred cases of syphilis seen during the last eighteen months in my laboratory at the Touro Infirmary, a large percentage of whom presented themselves on account of serious visceral and nervous lesions.

In addition to these and other widespread diseases large numbers of cases are seen suffering from such conditions as leprosy, pellagra, and various parasitic gastro-intestinal affections, notably amœbiasis, uncinariasis, and strongyloides infection, which are only rarely found in these latitudes. If one be fortunate, an occasional case of ainhum, elephantiasis, tropical ulcer, and yaws, may be found. I have had the opportunity of observing four typical cases of ainhum and one of yaws.

UNCINARIASIS: Owing to the climatic conditions, especially as regards temperature and humidity, being propitious for the retention of vitality and for the completion of the life cycle of the higher parasites, more especially the uncinaria and strongyloides, the exposure of the people to infection by these animals is present in all districts in which a most careful disposal of human excreta is not maintained. As is to be expected, conditions favourable to the dissemination of ova and larvæ are especially prevalent in the country districts and in the smaller towns.

At least 30 per cent. of those living in the country are infected with uncinaria, although by no means all individuals infected present symptoms which justify the use of the term, "hook worm disease." The Porto Rico Commission estimated 30 per cent. of the total death rate to be due to uncinaria infection. A certain moderate grade of anæmia, accompanied by œsinophilia, is, however, usually noted, together with an accompanying loss of physical and mental energy of greater or less degree. Individuals commonly commence to harbour the parasite in childhood, a history of "ground itch" during this period being usually elicited. There are, however, a considerable number of persons who appear to have been infected in adult life, in all probability by means of the digestive tract. Well marked cases of the disease present a condition of lack of development which may be sufficiently marked to merit the use of the term, infantilism. Under such circumstances, a

patient of twenty, or even thirty, years of age, will be no further developed either physically or mentally than a child of ten or twelve. The most marked cases, in addition to presenting an appearance characteristic of mental lassitude, are bloated or puffed up as the result of œdema. An important fact, in view of its bearing upon public health measures, is the mild symptoms presented by negroes, even though they harbour enormous numbers of the parasites.

The demonstration and identification of the ova is the only means of establishing the diagnosis. In this connexion, the ingenious method of centrifugalization of fæcal material in a series of fluids of varying specific gravity, renders the discovery of the eggs very simple, and should always be employed before giving a negative report in any suspected case.*

The appreciation of the importance of uncinariasis to the southern peoples is due largely to the effects and observations of Stiles of the Public Health Service. At the present time the study of methods of prophylaxis and cure of the disease is attracting much attention, and with the help of the Rockefeller Commission there is every probability that in a few years the parasite will cease to be the scourge which it is at the present time.

STRONGYLOIDES: Strongyloides intestinalis infection, while similar in many respects to hookworm, differs from it in two important particulars. In the first place, it is more difficult to eradicate and, secondly, on account of the complicated life history of the parasite, rarely are many parasites present in the one host. The mother worm, which makes its habitat the upper jejunum or duodenum, buries itself deeply in the mucosa, so that it is only with great difficulty that it can be attacked or dislodged. Here are laid the eggs, which usually hatch while still in the alimentary canal into male or female daughter worms, or a nondescript type which on account of its striped appearance is known as the rhabdidiform larva. It is these microscopic larvæ which are usually present in the stools, the ova being only occasionally found. When present the eggs can be differentiated from the hook-worm ova only with the greatest difficulty.

Nature, in her kindly providence, has rendered it necessary for the intermediate sexual cycle of the strongyloides life history to take place outside the animal body, except in very rare instances, so that single infection is the rule. In one case reported by Gage, and observed by myself, the larvæ had gained access to the upper

* Bass, *Archives of Int. Med.*, June, 1909.

air passages and there passed through the sexual cycle of development with the result that large numbers of mother worms were found in the gut and also within the lung tissue.

Tricocephalus dispar, or whip worm, is a common inhabitant of the intestinal tract, being occasionally present in large numbers, and, although not recognized as a pathogen there seems to be evidence in favour of anæmia, with its usual concomitant symptoms, being induced by its presence.

AMŒBIASIS: The larger nematodes and the tæniæ, including the nana, are found in a slightly larger percentage of cases than in Montreal. The smaller forms of animalculæ, notably the amœbæ and ciliates are, however, present in a majority of individuals, and occasionally in astonishingly large numbers. Considerable debate exists even at the present time, as to the part played by the amœbæ in producing intero-colitis. A very extensive amount of work has been carried out ever since Councilman and Lafleur first published their observations, which established the pathogenic properties of at least certain forms of the organism. In all probability it will be proven that there is one true pathogenic amœba corresponding to Chaudinn's histolytica, but that indirectly several others predispose to a diseased condition of the intestine as a result of the mucosa being rendered more susceptible to the action of the normal, intestinal flora through their irritant action.

TRICHOMONADS: It is the author's opinion that under certain conditions the supposedly harmless trichomonads are the indirect cause of severe gastro-intestinal disturbance. This group of ciliates, although common in many latitudes, is particularly prevalent in the warmer climates; in fact, very few stools are examined which do not contain these parasites. Occasionally they seem to form the bulk of the defecated material, and in as much as not infrequently the patients harbouring such tremendous numbers suffer from a colitis which cannot be accounted for upon other grounds, it seems justifiable to assume that the trichomonad is directly or otherwise the cause of the condition, especially since the pathogenic properties of other parasites, such as the amœbæ and the balantidium coli, have only been more recently appreciated.

PELLAGRA: Until more recent years pellagra was looked upon as a rarity upon this continent. Of late, however, the number of recognized cases has increased to an alarming extent, some observers estimating the number of cases in the United States to be as high as fifty thousand. As a result of this rapid rise in the importance of the condition, much space has been devoted to it in the medical

journals of the republic. In brief, pellagra is a disease characterized by various affections of the epithelium lined surfaces of the body and of the nervous system. Enteritis, cystitis, vaginitis, and stomatitis, are commonly present at some time during the course of the disease in addition to the characteristic dermatitis. With the exception of the skin manifestations no lesion presents any pathologic peculiarity characteristic of pellagra. The skin lesion which appears on the extremities, and somewhat less frequently upon the face and neck, begins as an erythema with, or without, bullæ formation. In general, the lesion is similar to a severe erythema solare, but is followed by a more intense pigmentation and epithelial proliferation or hyperkeratous. The histological appearance of the lesion is similar to that of *x*-ray dermatitis, and in view of this fact, as well as the clinical observation with reference to its development upon exposed parts of the body, there seems little doubt that the direct cause is sunlight, acting upon skin surfaces whose normal resistance to the sun's rays has been depressed. Intestrigo in the usual situations is commonly associated with other evidences of reduced epithelial resistance. The nervous manifestations consist of pain in the extremities, mental dulness, apathy, and not infrequently pronounced melancholia or mania.

At the present time no pathology of pellagra can be said to exist. There is no characteristic lesion, nor is the ætiological factor by any means determined. In so far as is known at present it would appear that, as the result of some factor whose nature is still problematic, there is induced a state of lessened resistance of the epithelial structures of the body, whereby they are rendered more susceptible to the action of irritants to which they are normally subjected. Lombroso, whose observations upon pellagra were very extensive and carefully carried out, believed that the ingestion of corn or other cereal improperly prepared accounted for the disease. At the present time, in the absence of any more plausible theory, probably the majority of writers on pellagra believe that it is caused by the presence in spoiled corn, or other similar food-stuff, of certain moulds which produce a toxin similar to ergot.

Recently more attention has been paid towards the possibility of the disease being parasitic in nature and communicated by insects. Sambon, whose statements have received widespread attention and comment, considers that on circumstantial evidence a gnat, (simulium reptans) can be proved to be the intermediate host for the causative agent. While very willing to accept any proof

which may be offered of the parasitic nature of the disease, I can only believe that, in the light of the facts at present at our disposal, the theory of ingested toxins best explains the character of the affliction. Bass, of New Orleans, whose observations upon pellagra have been very comprehensive, has lately published a report upon pellagrous symptoms produced in the common fowl by means of feeding with corn infected by a microörganism isolated by him from the fæces of pellagrous patients and cultivated upon cornmeal agar.

The mortality percentage of the disease in the United States appears to be higher than in Italy. A considerable number of cases, however, if recognized sufficiently early, recover. The form of treatment which has proved most efficacious consists of a change of diet, removal to a cool climate, and protection from direct sunlight. The administration of arsenic seems valuable, and many cases improve under salvarsan or atoxyl injections. Cole, of Mobile, reports very good results following transfusion. Symptomatic treatment must, of course, be carried out for the relief of the individual manifestations, enteritis, cystitis, etc.

LEPROSY: Leprosy is a disease the existence of which has been recognized for many centuries, and one which, as the result of tradition, more especially scriptural in origin, is looked upon by the majority of laymen, and to a not inconsiderable degree by members of the profession, with a sense of horror and fear which is well-nigh inhuman in its cruelty to the individual, but which is based largely upon ignorance. Remove the stigma of incurability from the affection, and leprosy becomes a disease of comparatively little importance when compared with tuberculosis, syphilis, typhoid fever, etc.

The bacillus lepræ shows a preference in its growth within the body for two tissues in particular; namely, the skin, including the mucosa of the upper air passages, and the nerves. Of the latter, the ulnar and the peroneal are those by far the most frequently affected. The lesion produced is essentially proliferative in type and characterized in all older lesions by the presence of large multinucleated cells which contain masses of bacilli known as globi. It is by the extension of proliferative processes within the nerve sheath that the nerves are at first irritated and ultimately destroyed. Following the comparatively short period of hypersensitiveness, pain, and other evidences of an active neuritis, to which Van Wart has drawn particular attention, there is a loss of function on the part of the nerve evidenced by analgesia, trophic disturbances, and paresis or paralysis of certain muscles. Main-en-griffe and foot-drop are common early symptoms of the disease.

As the result of the loss of trophic control, parts supplied by destroyed nerves atrophy, and fingers and toes, more particularly the fifth on both hand and foot, may become infected and require removal, or else undergo dry gangrenous change and amputate spontaneously. In all old neglected cases this atrophic condition results in the loss of all the fingers and less frequently of the toes.

The picture of the leper as usually described is that of an individual of leontine appearance with fingers and toes dropping off, and foul ulcerating surfaces covering his body; in brief, an object of disgust and loathsomeness. Leucodermic patches have also been considered characteristic of leprosy, although it is difficult to understand why this is the case, unless it be that in districts in which lepers are ejected from communities and have to shift for themselves, as best they may, the site of healed ulcers, which develop under circumstances of neglect, present such an appearance. Trophic ulcers undoubtedly do occur, but in individuals who are at all adequately cared for they are uncommon and heal comparatively readily. The lion-like face, resulting from the destruction of the nasal septum and the prominence of the soft tissue through tubercular infiltration, is met with only in cases of very long standing, in what might be called the terminal stage of the disease. As mentioned before, the loss of fingers and toes, and contractions, do take place. Such deformities are, however, by no means horrible. In a word, there is no just cause for the impression generally held of the appearance of the leper, unless cruelty of his fellow-men has aggravated his misery ten-fold by throwing him upon his own resources and then excluding him from any means of making a livelihood.

Nor is leprosy a disease which is easily communicated. Experimental as well as clinical observations indicate that it is only as the result of prolonged intimate contact and repeated inoculations with relatively large numbers of bacilli that the disease is engrafted. It is the author's belief that the naso-pharynx is probably the source of infection in the majority of instances.

The skin lesions are of several types, the two most common being the macular and tubercular. The macular lesion consists of a slightly raised, somewhat firm, irregular area, similar in many respects to erysipelas, but of a more coppery colour. The typical tubercular lesion is a raised, very hard, dry nodule, usually brownish in colour and resembling the fibrous masses of von Recklinghausen's disease. It is as the result of confluence of tubercles upon the face and in the lobes of the ears that the leontine facies develops.

In the early months of the leprous infection, a curious lesion known as a neuro-lepride is seen, which is of the nature of an angio-neurotic œdema and resembles very closely simple urticaria. This lesion is transient and may appear each day in a different part of the body; the arms and face, however, being the most often affected. None of the cutaneous lesions show any marked tendency to ulcerate as there almost invariably persists a layer of uninfiltrated connective tissue immediately beneath the epithelium. In the naso-pharynx, however, as the result of maceration of the mucosa, ulceration is common, and it is from these lesions that the danger of infection to others comes.

The course of leprosy is, as is well known, extremely slow; in fact under proper care the leper will probably live almost as long as the majority of his more fortunate neighbours. But if the bacillus is slow to destroy the individual, the human organism is equally slow to eliminate the invader, for although individual lesions may disappear spontaneously, as the result of *x*-ray or other treatment, it is the rule for them to reappear elsewhere. Many measures have been employed, such as arsenic, chalmogra oil, hot baths, forced feeding, etc., but without much success, although there seems to be no doubt that a small percentage of cases recovers under simple constitutional treatment. It is my belief that many of the cases classified as pure anæsthetic or nervous types are cured of leprosy, at least in so far as active disease is concerned.

During the winter of 1909, Dr. C. W. Duval was successful in corroborating Clegg's work upon the leprosy bacillus and in obtaining pure cultures by means of an ingenious method for the liberation of tryptophane. The first isolations are slow growing, but after a few months' growth are relatively rapid, so that sufficient material for experimental purposes is readily obtained. Following the cultivation of the bacillus, Dr. Duval and myself, assisted by Dr. Ralph Hopkins, at once commenced experiments, both upon animals and human beings, which have led, we believe, to a method of treatment of leprosy which not only is successful in apparently eradicating the disease, but which is comparatively rapid in its results. Time does not permit my describing, in detail, the methods employed; suffice it to state, that it is possible by means of inoculations, either of suspension of the bacilli or, better, of the protein content, as represented by the chloroform insoluble portion of the bacillus, to induce acute inflammatory changes in the leprous lesion, which are sufficient in many instances at least to destroy the bacilli.

From our experiments we are convinced that the ordinary

immune bodies are of little importance in controlling the viability of the leprosy bacillus, but that a condition of allergy must be induced in order to stimulate the polymorphonuclear cells to active phagocytosis, for in this way alone does it seem possible to influence favourably the disease. Doses of either bacilli or protein, which are insufficient to induce a hypersensitive state, appear to affect in no way the course of the infection.

Many cases were treated by employing small doses for many months without the slightest effect. If, however, a sufficient amount of material be inoculated, the following phenomena are noted: within twenty-four hours there is a swelling accompanied by redness, pain, etc., at the site of the inoculation, which may ultimately suppurate. The patient complains at this time of more or less headache and malaise, which is accompanied by a rise in temperature of from one to four or six degrees. The individual lesions also undergo an acute change, gradually increasing in size and becoming red. At the end of two or three days softening will take place. If incised, a considerable amount of purulent material is discharged, composed chiefly of polymorphonuclear leucocytes, which upon microscopic examination are seen to have been phagocytized. Whether incised or not, resolution ensues, with the result that at the end of three or four weeks, not only is there no evidence of an acute inflammation but the original leproma has also disappeared. As a rule the older lesions, that is, those containing the largest number of bacilli, react in this manner first, the remainder being affected only when larger doses are employed. Coincident with the local and constitutional disturbance, there is a leucocytosis ranging from 12,000 to 20,000, the increase being due to a larger number of polymorphonuclear leucocytes. By means of repeated increasing doses of the bacillary suspension, all the lesions may be induced to react in this manner till no evidence of the infection remains.

The phenomena described are analagous to those which occur normally during the course of the disease, and are designated lepra fever. It has long been recognized that it is customary for the patient to improve rapidly following such attacks, but rarely if ever does a complete cure result. By means of bacterial inoculations we are now in a position to induce at will these acute exacerbations, which have been shown to be conservative in effect. We are enabled to control the severity of the attacks, and thus to guard against possible untoward results.

SOME PHYSIOLOGICAL ASPECTS OF REFERRED PAIN

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PAIN has been defined as a variety of sensation whose existence we desire to terminate; it is a variety of sensation in that it requires the same physiological conditions as does sensation; namely, a nerve and nerve-centre and the presence of consciousness.

Thus, in leprosy, where the nerves are degenerated, there is no pain in the parts affected, and in paraplegia from complete transection of the spinal cord, there is no pain in the legs. When the nerve-centre is itself narcotized, pain is abolished; in the former cases analgesia is due to a peripheral, in the latter to a central, cause. There are, then, both physical and mental factors in pain. "Christian Science" has lost the sense of the proportion between these and magnifies the latter to the exclusion of the former.

We might classify the varieties of pain as follows:—(1) Pains from an over-stimulated sense-organ as, for instance, from too bright a light, a rasping sound or discordant intervals, excessive heat or cold, muscular cramp. (2) Pains from injury, mechanical or otherwise, to an exposed or naked nerve fibre; as from a thorn or a corn in the skin, a foreign body in the tooth-pulp, pressure of pus in a boil or abscess, or of blood within rigid capsules, the freezing of a nerve; and all cases of injury to nerves, such as transfixing or crushing them. Thus, Romberg's saying that "pain is the prayer of a nerve for blood" is not universally true, for a nerve may be painful from being engorged with blood. (3) Pure pains or pains of viscera and of such organs as are not provided with nerves of touch proper, besides the viscera themselves, the blood-vessels, the meninges, the periosteum, and the nerves themselves. (4) Pains called "referred" and sometimes "sympathetic" and "reflex." (5) Hallucinatory pains of "the absent member."

The viscera, in which we may include the heart, the blood-vessels, and nerves, are apparently so badly supplied with nerves

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of touch, that we are normally unaware of their presence and cannot, therefore, localize them except in the vaguest manner. Though we must believe that afferent currents are at all times ascending from the viscera, they do not in a state of health obtrude themselves on our consciousness. This is well exemplified in the case of the lungs from which it has been definitely proved afferent currents are continually ascending by the vagi to the respiratory centre, although these currents certainly do not enter into consciousness. Similarly, the iris, the pleura, the heart, the liver, and gall-bladder, the reproductive viscera, the periosteum, and the meninges, provided they are perfectly normal, are entirely outside the mental realm. The last mentioned tissues—the spinal meninges—are interesting in this connexion, seeing that the existence of recurrent sensibility as an exception to the Bell-Magendie Law is to be explained by the presence of fibres afferent from the coverings of the spinal cord. It will be remembered that it is their stimulation in the peripheral stump of the anterior root which gives rise to the pain occasionally experienced in experimental irritation to some of those roots. Surgeons tell us that the normal liver is insensitive to diagnostic puncture, and the cerebrum itself to operative procedure.

But this state of things is considerably altered when the viscera become abnormal—inflamed, congested, catarrhal, ulcerated, or distended. Here the pain may arise either from morbid mucosæ or from morbid muscles, for instance in cramp; or from both together. The pains of iritis, angina pectoris, aneurysm, pericarditis, pleurisy, bronchitis, gastritis, gastric and intestinal colic, the pain of colitis, of biliary and renal colic, in diseases of the bladder, testes, ovaries, and uterus, are therefore true visceral pains or cases of pure algesia. In certain forms of neuritis, for instance in sciatica, the congestion or tension in the perineural sheaths irritating the nervi nervorum must be the basis of the pain; the nervi nervorum are, therefore, purely algesic nerves. It is, of course, theoretically possible that there are no nerves of pure pain in the viscera, and that the nerves of common sensibility are stimulated only by such excessive irritations as become painful in consciousness, whereas the normal states of the tissues constitute only subliminal stimuli. Physiologists have, however, a good deal of reason to hold that there are nerves, other than visceral afferents, which are nerves of pure pain. In physiological language, then, the viscera and other autonomic structures (Langley) possess afferent fibres which in health are stimulated so slightly that localization is extremely vague or non-existent, whereas in morbid conditions these fibres convey impulses

which are decidedly painful, although they may not lead to any more definite localization.

It is these visceral pains that have a great tendency to be referred into the skin. In order to understand how this can take place, we must have before us the physiological anatomy of a spinal cord segment and its connexion with the autonomic system.

The visceral (autonomic) afferent neurone, leaving some peripheral tissue, passes through one of the prevertebral ganglia and enters the vertebral chain of the sympathetic system. In this it travels headward and turns aside into a white ramus communicans, whence it enters the spinal nerve immediately after its formation and thence turns back into the posterior root of that nerve. In the ganglion of this root it has its trophic cell after the manner of the much better known afferent somatic fibres. Passing central of the ganglion, it enters the dorso-lateral region of the white matter of the cord in which it bifurcates, an ascending limb travelling, presumably, towards some cerebral region, the descending limb entering the grey matter of the posterior horn in which it and its collaterals may terminate synaptically.

Now it is clear that the afferent neurone from the skin (sensory cutaneous fibre) and the afferent neurone from the viscus have a common path of entry into the cord from the posterior root inwards; the theory of referred pain (tenderness or sensation) is that somewhere in this common path the excitement of the splanchnic afferents is transferred to the somatic afferents, and that, the cerebral centre for these being stimulated, the mind suffers an illusion and refers the source of the irritation out to an area of skin. Psychologically, this is an algesic illusion due to peripheral reference. All viscera whose afferent fibres enter white rami communicantes, or their homologues, may therefore have skin-areas to correspond with them; or, put otherwise, in all such spinal segments whose nerves receive white rami communicantes, there is the possibility of the transference of nerve-impulses from visceral to somatic afferent neurones.

As far as we know, visceral irritation does not give rise to referred pain in muscles, although the afferent fibres from muscles also enter by the posterior roots. As far as we know, cutaneous irritation does not give rise to referred pain in viscera; so that it has been said, the skin is sympathetic with the viscera, but not the viscera with the skin. The most likely place of the transference is in the grey matter of the spinal cord, for here the naked collaterals of the autonomic and the somatic afferent fibres are in close contiguity; it is a much more probable place than is the posterior root

in which both fibres are still medullated. The seat of transference of irritation (nerve-impulses) is, therefore, more probably in cord segment than in posterior root; we shall later see that this view is pretty fully corroborated.

We might now look a little more in detail at some of the evidence which Professor Langley has brought forward to indicate the existence and the precise path of entry of the afferent fibres of the autonomic system. In the first place, they do not enter the cord by the anterior roots because stimulation of the central end of the cut anterior root gives rise to no reflex actions (Bell-Magendie Law). They do not enter by the grey rami communicantes, because stimulation of the central end of a cut grey ramus calls forth no reflex actions. From other data we know that the grey rami contain only efferent fibres (the somatic vaso-motors).

We have, therefore, only left as paths of entry the white rami and the posterior roots. First of all, stimulation of the central end of a cut, white ramus does give rise to reflex action, proving that the white ramus contains afferent fibres. This is confirmed by the following observation: a section of the spinal nerve inside the vertebral canal but, of course, peripheral of the posterior ganglion, causes all the medullated fibres of the white ramus to degenerate, therefore, all the afferent fibres in the white ramus must have their trophic cells central of this spot, and as there are no afferent fibres in the anterior roots, the trophic cells must be found in the posterior ganglion. Conversely, if the splanchnic nerves are cut or the sympathetic chain itself, no degenerated fibres are found in any of the white rami, showing that the cells trophic for these fibres are situated somewhere proximal of the place of entrance of these fibres into the nerve-roots.

But further, if one considers the path of entry of the afferent fibres from the skin, it will be obvious that these must have their trophic cells in the posterior root ganglia, for the cutaneous sensory fibres have no peripheral ganglia to pass through en route for the spinal cord.

The same lines of reasoning apply to those structures homologous with the white rami; namely, the origins of the pelvic splanchnics or sacral autonomic fibres. If the posterior roots of the second, third, and fourth sacral nerves be cut outside the ganglia, one-third of all the fibres in the pelvic splanchnics are found to be degenerated, proving such fibres to be afferent. Once again, when the English worker, Warrington, cut both roots of the first thoracic nerve (the posterior between the cord and the ganglion),

and found that one hundred and thirty-six fibres in the white ramus did *not* degenerate, he demonstrated that these still normal fibres entered by the posterior root, in which they had trophic cells, for it had been previously shown that not all the fibres in the white rami are efferent, and that no fibres of white rami enter the cord by the anterior roots. Only those skin-areas with afferent neurones which enter the grey matter of the cord along with visceral fibres through white rami or such homologues as the pelvic splanchnics, can have referred pain by transference of nerve-energy in their own cord-segments. Thus, the segments receiving fibres from that part of the sympathetic system known as the dorsal outflow (from second dorsal to second lumbar nerves, inclusive) can be the seat of such direct transference as leads to referred pain, as well as segments corresponding to the second, third, and fourth sacral nerves which are similarly related to the sacral autonomic outflow.

Since, then, the fifth to the eighth cervical nerves and the first dorsal nerve have no white rami communicantes, the segments to which they are related are not the seats of the transference necessary to evoke referred pain, and hence the related skin-areas are exempt from it and constitute what Dr. Head has called "the brachial gap." Although, indeed, the first to the fourth cervical nerves have no white rami, yet since the segments of their origin are accessible to the transference of nerve-impulses from irritation in the medulla, the skin innervated by these nerves is liable to referred pain, which we might describe as due to medullary irradiation. According to Dr. Head there is also a lumbar gap related to the third and fourth lumbar segments.

We might now take some definite examples of referred pain well known to medical diagnosticians. The referred pains of dyspepsia, gastric ulcer, and hepatic disease are experienced in the cutaneous distributions of the anterior and posterior branches of the fourth and fifth dorsal nerves, because, as Dr. James Ross pointed out in *Brain*, as long ago as 1887, the afferent splanchnic fibres from the stomach and liver enter into the fourth and fifth dorsal segments. In lesions of the small intestine, the pain is referred chiefly to the anterior division of the ninth, tenth, and eleventh dorsal nerves, that is around the umbilicus. In diseases of the kidney and ureter the pain is in the skin-areas related to the tenth and twelfth dorsal and the first and second lumbar segments, and therefore related to the distribution of the ileo-inguinal and genito-crural nerves. Morbid states of the ovaries cause referred pain in the areas of distribution of the posterior branches of the second lumbar nerves and of the

anterior and lateral branches of the first, second, and third lumbar nerves.

Similarly, pain referred from the testicle involves the first lumbar segment, that is, the ileo-inguinal nerve. Pains from lesions of the bladder and prostate in the male are experienced in skin-areas related to the third and fourth sacral segment, and as these receive the pudic nerve, the reference is to the tip of the penis. The rectum causes pain to be referred to the distribution of the second and third sacral segments, that is, to the areas innervated by the small sciatic nerve. The uterus gives pain referred to the nerves at the back of the sacrum from the involvement of the second, third, and fourth sacral segments.

We must, therefore, believe, in cases of referred pain, that there is somewhere in the grey matter of the cord or medulla an actual transference of neurine from a deep afferent fibre to a superficial one. If this neurine were to be transferred from the terminations of the autonomic afferent fibre to the cells of origin of any efferent neurone, we should have reflex action instead of referred pain. But, as a matter of fact, it is possible to have both simultaneously, as in cases of severe referred pain over certain intercostal spaces being associated with actual spasm of the underlying intercostal muscles. The presence of true reflex action along with the severe referred pain of hemicrania is well illustrated by the following case which lately came under my notice. A patient had severe, periodic, hemicranial headache, associated with vaso-constriction on the same side of the head, secretion from the nasal glands, spasm of the sterno-mastoid, and vomiting. The interpretation of this complex of symptoms is probably as follows: the irritation due to the gastric catarrh and toxæmia violently stimulated certain terminals of the afferent gastric branches of the vagus, which conveyed nerve-impulses towards the sensory centres of the ninth and tenth nerves in the medulla oblongata. Here there was transference of irritation to certain terminations of afferent neurones of the ophthalmic division of the fifth nerve, giving the severe post-orbital headache, but there was also irradiation of impulses to the following centres—vaso-motor, vomiting, for the spinal accessory nerve, and for the glands of Bowman, producing, respectively, vaso-constriction of the vessels on the side of the face, vomiting, spasm of the sterno-mastoid, and the artificial coryza.

There must have been, in this case, a very wide irradiation of impulses from the sensory centre of the vagus to neighbouring centres of the medulla oblongata; in this way we can understand

how it is that very great pain can produce shock, if by "shock" we understand what some assert it to be, over-stimulation of the vaso-motor centre resulting in general vaso-motor constriction. (On the view of others it is rather a reflex inhibition of the vaso-motor centre.) The irritation produced by lesions in some structures, small in themselves, is very liable to be referred to areas of skin of considerable size, that is to *irradiate*. Thus, in dental caries, the transference is from some of the inferior maxillary neurones to others of the same branch of the fifth nerve, giving the face-ache so characteristic of tooth-ache. But, of course, the transference may be to another branch of the tri-facial nerve, as in a case I noticed lately, in which unilateral nasal turgescence produced considerable pain in the normal maxillary antrum of the same side, that is, the transference was from neurones of the ophthalmic branch to the superior maxillary branch of the fifth nerve.

As every one knows, a large number of headaches are pains referred from regions other than cephalic. The headache of gastric and hepatic catarrh is probably a referred pain, resulting from severe vagal irritation, the transference being from the medullary terminations of the vagus to certain afferent neurones of the tri-facial. That the vagus is in this case the afferent path from the stomach to the central nervous system, is rendered the more probable by some recent work of Professor Brodie and Dr. Miller of Toronto, who have shown that, as regards the reflex action of vomiting, the vagus is the only afferent path from the stomach.

But cephalgia is not the only pain referred from the stomach: in gastric colic the pain is most distinctly felt over the chest—"breast-bone pain"—which is held to be explained by the fact that the visceral afferents from the stomach enter the spinal cord by the fourth and fifth dorsal segments, the same whereby somatic afferents from the sternal skin also enter it. Now the view that gastric colic rather than gastric catarrh should affect the afferent fibres from the stomach, is quite in accordance with the conclusions come to by Dr. Hertz, of London, who has made a special study of visceral sensation and pain (*Lancet*, April 29th, 1911). Dr. Hertz believes that fibres afferent from the muscular coats of the viscera are the fibres whose stimulation is the basis of visceral pain; distension and dysperistalsis, rather than any conditions of the mucosæ, being the *adequate* stimuli for hollow viscera. He quotes Professor Langley to the effect that most of the afferent sympathetic fibres of the intestine arise in the muscular coat; thus it is evident why afferent impulses from the visceral muscle in spasm traverse the abdominal

autonomic system and so affect segments concerned in "the dorsal outflow," whereas any irritation ascending by the vagus, and presumably from the mucosæ, is referred to cephalic skin-areas. The double, afferent, autonomic supply thus explains why such an organ as the stomach can give rise to referred pain in such widely separated parts as the head and the mid-region of thoracic skin.

A similar problem presents itself in the case of the heart which has a double innervation at least on the efferent side, namely, through the vagi and the cardio-accelerators of the sympathetic system. The afferent innervation is not nearly so well known: the depressor nerve of Ludwig and Cyon, afferent fibres reaching the nucleus of the vagus, is one path, but whether there are any afferent fibres entering by the "dorsal outflow" is still a matter of doubt. Their existence must, however, be postulated, because of the frequency of pain in the left arm in left cardio-valvular disease. Here the pain is referred to the cutaneous distribution of the intercosto-humeral branch of the second intercostal nerve, a branch of the second dorsal. Now we know that the cardiac dorsal outflow on the efferent side is through the second and third dorsal nerves, and presumably the cardiac inflow is by the same nerves.

Some writers have virtually suggested that the afferent impulses in cardiac irritation are ascending the efferent sympathetic neurones (cardio-accelerators); but this is physiologically improbable, since it involves the supposition that anti-dromic influences could not only ascend these efferent neurones but also pass over their cells of origin in the medulla (cardio-accelerator centre), and thus break the law of "valve-action" at a synapsis.

We might now ask ourselves, Is there any evidence to point to the kind of fibre, physiologically considered, which is concerned in the reference of pain to the skin? From the skin there are at least two kinds functionally. (1) Those subserving the sense of touch, the "epicritic" of Head. (2) Those concerned in painful sensations, and in those of heat and cold, the "protopathic" of Head.

That the paths from skin into the central nervous system for touch, on the one hand, and for pain and heat and cold, on the other, are different, is pretty well established: when pain is absent the thermæsthetic sensations are also, and vice versa. But touch may be retained when the other two sets of sensation are abolished, and vice versa.

Now we have a good deal of evidence to the effect that the peripheral distribution of tactile fibres is not the same as that of

pain and heat and cold fibres. Professor Sherrington showed that the section of one posterior root did not abolish touch in any one given cutaneous area; in order to produce complete anæsthesia there one must cut through several adjacent posterior roots. The impossibility of producing anæsthesia by the section of only one root is due to the fact of "overlapping innervation." The tactile innervation of any given skin-area is, then, from more than one segment of the cord; and, as might be expected, the areas of tactile anæsthesia are irregular in outline.

Sharply contrasted with this is the state of matters of the protopathic fibres—the algesic and the thermæsthetic. When, in disease of contiguous spinal cord segments, there are present areas of painless skin, it is found that these analgesic zones do *not* overlap, and it is also known that the areas in herpes zoster do not overlap. According to researches of Dr. Head, the areas of referred tenderness or pain in visceral disease are characterized by their not overlapping. The area of loss of pain is always more definite and more extensive than that of the loss of touch. Dr. Head has also pointed out that the centre of an area of referred pain is not only hyperalgesic, that is, more sensitive to real local pain, but it is also hyperthermæsthetic, or more sensitive to heat; this Dr. Head calls "the maximum spot." Taking all the facts just mentioned into consideration, we seem to be able to affirm that referred pain is related peripherally to those fibres from the skin concerned in the sensation of pain and heat and cold; and that the central mechanism of the transference is in segments of the grey matter of the cord and neither in the posterior roots nor their ganglia. If any impulses related to referred pain actually reach the periphery, as some imagine they do, and are of an atrophic nature, they must certainly be antidromic in these algesic fibres.

History: Referred pain, as "sympathetic" pain, figures pretty conspicuously in the history of ideas regarding the functions of "the nerves of vegetative life," as the autonomic nerves were for so long called. The presence of ganglia on the abdominal sympathetic nerves was known to Galen. How the term "sympathetic" came to be applied to the nerves now so called, seems to have arisen somewhat in the following way: actions, which we now call voluntary were known to be carried out by the cerebro-spinal nerves, so that apparently those actions known as sympathetic were carried out by the ganglionated nerves. Sympathetic activities included those we know as reflex as well as cases of referred tenderness and pain.

Thus, if we take such a work as Bostock's "Elementary System of Physiology," (London, 1836), we find the following described as sympathetic: (1) True reflex actions; the examples given being vomiting from irritation of a biliary calculus and contraction of the diaphragm in sneezing. (2) Cases of referred pain, the examples given being headache from dyspepsia, and pain in the shoulder from liver disease. (3) Abnormal (hysterical) mental conditions, epidemic mental affections, induced by personal fascination or by imitation of fanatics or by "personal magnetism" (Adam Smith, Dougald Stewart, and Alison). Also such imitative states as epidemic dancing and the mutilating manias of the Middle Ages.

As regards referred sensation, the condition had been noticed nearly one hundred years before by that extraordinary observer, the Rev. Stephen Hales (1727).

The views held at the close of the eighteenth century as to the offices of sympathetic nerves and their ganglia, can be learned from Prochaska's work, "The Functions of the Nervous System." Prochaska adopted the view that ganglia on nerves impede or obstruct sensory impressions ascending the nerves. This seemed reasonable from the apparent fact that we have no sensations from certain internal organs whose nerves have ganglia on their course. The converse of this, that the mind could not affect the viscera, because their efferent nerves passed through ganglia, seems to have originated with Tissot (1728-1797). Prochaska wrote, "The mind has no immediate control over the heart, stomach, and intestines, because the impressions made by the will on the origins of the nerves do not appear to be able to pass through the ganglia of the great sympathetic nerve." This false doctrine of the blocking of impulses by ganglia was held to apply to ganglia on cerebro-spinal as well as those on autonomic nerves, which explains Prochaska writing as he did thus: "He who shall unravel the uses of the ganglia will also give a reason why the fifth pair of cerebral nerves pass through the semi-lunar ganglion . . . . and why only the posterior roots of the spinal nerves enter the ganglia, whilst the anterior roots pass by without any communication with them." This was exactly what Magendie had explained by 1822. So competent a student of the nervous system as Reil, in the year 1811, the year of the publication of Bell's first pamphlet on the functions of the two roots, stated his belief in the blocking doctrine. By 1822 Magendie had demonstrated with great experimental fulness the law of the two roots, that the anterior was efferent only, and the posterior afferent only. Bell had already made it clear

that the Gasserian ganglion was the analogue of the posterior spinal ganglia, and that neither the one nor the others interfered with impulses going into the brain or spinal cord. But the ganglia, especially the sympathetic, had been for long credited with a positive function, namely, that of being the set of reflex actions. Although, of course, the term "reflex" was not in all cases used, Vieussens, Hermann Boerhaave, Vater, Meckel, and Gasser all believed that nerve-impulses (though they did not employ that term) were turned back towards the periphery at the nerve-plexuses and ganglia.

Prochaska puts it clearly thus: "Further, it may be asked whether the external impressions made on the terminations of the nerves and passed onwards to the ganglia are extinguished in the ganglia themselves, or whether being reflected there by a fixed law they return again along the nerves to the parts to be moved." Long after sympathetic ganglia were shown to be composed of nerve-cells, the possibility of their being reflex actions was believed in, but Professor Langley, who has gone into this question with considerable care, has come to the conclusion that there is no unequivocal example of a reflex action being carried out through the intermediation of any peripheral ganglia, with the possible exception of the enteric ganglia.

Both the original surmises as regards the ganglia have been shown to be incorrect, they neither block afferent impulses nor do they mediate reflex actions; the prophecies concerning their functions have proved peculiarly unfortunate. Some guesses in science have been subsequently proved right, those as to the sympathetic system and ganglia generally have not been of this order.

"Is there any regulation permitting a medical inspector or nurse to send home a boy who has a hole in one of his teeth, with instructions to stay away until the tooth is filled?" asked Trustee Hodgson. "I'll promise that an investigation will be made," said Trustee Lewis, and that was satisfactory.—Toronto *Telegram*, March 7th, 1912.

THE INTRAPERITONEAL ROUTE IN OPERATIONS ON THE URETERS

By Robert E. McKechnie, M.D., Vancouver

THE peritoneal cavity, until within comparatively recent years, was a region to be avoided by the surgeon, but, thanks to the evolution of surgery, to-day it can be invaded almost with impunity. The bile tracts, whether sterile or septic, the stomach, the intestines, which are virulently septic, the Fallopian tubes, often loaded with pus, all are attacked with confidence. But the ureters, although their contents are generally sterile, are severely let alone, and but little reason can be given to explain satisfactorily the avoidance of the trans-peritoneal route in operating on them.

Thus Keen, in his "Surgery," advises a long lumbar incision in rupture of the ureter. "For stone in the ureter in the upper part, operate through the ordinary kidney incision." "For all other stones, except in the very lowest segments, the retro-peritoneal operation is to be selected." "In a number of cases it may be necessary to make an exploratory laparotomy to locate the stone." "For purposes of repair, removing stones, or excision, the ureter can be exposed by either the retro-peritoneal or trans-peritoneal route. The latter procedure is rarely justifiable." "The trans-peritoneal route is at present indicated only in lesions of the lower segment, for repair operation, and for digital exploration."

Cheyne and Burghard in their article on "Ureterectomy," say: "In order to remove the ureter completely, down to its insertion into the bladder, several methods are employed. The peritoneal route has been adopted by some, the abdomen being opened while the patient is in the Trendelenburg position, and the peritoneum being divided over the ureter, and the latter removed. While this may be a possible route in cases of ureterotomy for stone, it is not advisable for the excision of a tuberculous ureter," and the lumbo-ilio-inguinal incision is recommended. For the removal of the terminal portion, they prefer the sacral route, much as for Kraske's operation on the rectum. They also say that in impacted stone, "the calculus must be removed without delay, if possible by an extra-peritoneal operation." "In very doubtful cases a median

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exploratory laparotomy may have to be performed in order to ascertain the condition of both ureters throughout their whole length; if this be done, the laparotomy wound should, if possible, be closed, and an extra-peritoneal operation performed for the removal of the stone from the ureter."

In Burghard's "System," we find: "The ureter may be exposed either by a trans-peritoneal or by an extra-peritoneal operation—but the former is now only employed when the surgeon is uncertain as to the situation and nature of the obstruction, etc." "There are many objections to the trans-peritoneal method. Unless the ureters be considerably altered by disease they are difficult to find behind the abdominal viscera; the peritoneum is opened both behind and in front, and in the event of any leakage of urine from the ureter, may become infected. The position of the wound does not permit of free drainage, etc."

R. Lawford Knaggs, surgeon to the Leeds General Infirmary, and professor of surgery in the University of Leeds, in the *British Medical Journal*, May 21st, 1910, in a paper on "The Sacral Route for Implantation of the Ureters into the Rectum," chooses a very difficult method, while the same object could have been attained with infinitely less trouble by the abdominal route.

In further confirmation of the attitude of the surgeons of the present day, Morris says, "Nothing should induce the surgeon ever to incise a ureter through the peritoneum unless he is absolutely sure of the aseptic nature of the urine." And Freyer says, "Considering the grave danger of urinary leakage, I hold that, even when the abdomen is opened for the purpose of effecting a diagnosis, if a stone is located in the ureter the abdomen should be closed and the calculus removed at a subsequent date, extra-peritoneally."

So that we find that the concensus of opinion is against the use of the trans-peritoneal route. But on what is the objection based? Either there are valid objections or else the incubus of tradition, existing from before the days of Listerism or the development of modern technique, is cowing the minds of the members of this most progressive science. I venture to affirm that the latter furnishes the explanation. Blind tradition still rules the realm of ureteral surgery. The various text-books give no reason for their dicta, merely a rule that the peritoneum should not be invaded. Some of the later writers mention the dangers of urinary leakage and of sepsis, but I think I can show that these dangers are not great; and apparently nothing else stands in the way of adopting more rational methods. By the abdominal route, and the use of

inverted position, exploration is more perfect and more readily done, especially in the otherwise more inaccessible portions of the ureters, and operations can be more easily performed and the details more perfectly executed than could ever be hoped for by the retro-peritoneal route. If modern technique can master the problem presented by operations on the bile tract, the bowels, or the tubes, surely it can be made to answer for the ureters, and a formidable and difficult operation rendered easy and safe. That it can be done, will be shown by the two cases I present. There is no need to apologize for wounding the ureter. Any one who does much pelvic work will sooner or later do so. However, these two cases are my only ureteral accidents in over two hundred hysterectomies.

The first case I shall narrate occurred in a woman of about forty. She gave a history of long-standing pelvic trouble, and on opening her I found the pelvis blocked by a large mass, including uterus, adnexæ, and a pelvic abscess, limited by dense adhesions. While removing the left ovary and tube, I stripped about two and a half inches of the left ureter bare, and expected trouble. However, I covered it with the remains of the broad ligament. The right broad ligament I closed by a continuous suture, and did not look for trouble from this side. I left supra-pubic drainage on account of the pus, and as it discharged freely the drain was still in on the tenth day. Up to this time, the urine had been normal in quantity, so that I thought I was safe. But on the tenth day the urine ceased coming from the bladder and discharged through the supra-pubic drain. The complete cessation of the urine by the urethra puzzled me. Only two conditions could explain it: either an opening in the bladder, or a simultaneous giving way of both ureters. This latter did not seem probable. I had half expected the left ureter to give way, but not both. A self-retaining catherer in the bladder discharged a little urine for a few days, and then it ceased. Eventually, I opened the abdomen and found that both ureters had given way, the left from necrosis due to imperfect blood supply, caused by stripping it bare, the right from a stricture caused by my continuous suture. A passage way for the urine led from the breach in the right ureter across the pelvis to the opening in the left, and thence to the abdominal wound. This sinus was completely walled off from the general peritoneal cavity, yet I have no doubt that for some time after the tenth day the pelvis must have been full of urine. As for adhesions, I was agreeably surprised to find but few, and these were very easily separated. To repair, I operated through the abdominal wound, the patient in the Trendelenburg position,

and implanted the ends of both ureters, divided above the points of leakage, into the bladder, letting the remaining distal portions look after themselves. There was a good deal of tension, and my implantation must have been faulty, for following the operation, a great deal of urine welled up through the supra-pubic drain which I left in, so that the pelvis must again have been flooded with urine; but leaving a self-retaining catherer in the bladder, the supra-pubic discharge finally ceased, and a year after the operation I had the pleasure of receiving a letter from the patient saying that all was well and that she was enjoying better health than she had for years.

My second case was one in which I had performed a supra-cervical hysterectomy for fibroids, removing the adnexæ as well. The left ureter was not in its normal position, being found about the middle of the broad ligament, and I must have constricted it by my continuous suture, which closed the broad ligament. In a few days urine began escaping from the vagina, and was found coming from the stump of the cervix. I waited for several weeks before attempting repair, then made a median supra-pubic incision, and with the patient in the Trendelenburg position, effected an implantation into the bladder. In this case, owing to the site of the breach in the ureter being near the bladder, there was less tension on the sutures. In addition, I passed a linen thread up through the urethra and bladder, taking a bite in the end of the ureter, and tying the lower end of the thread around a piece of rubber tube placed across the orifice of the urethra. This aided in relieving tension on the sutures at the site of the implantation. I left a supra-pubic drain in for a few days, for fear of leakage, but none occurred, and the patient made an uninterrupted recovery.

I also am pleased to be able to quote some recent experiences in this work which fortify me in my argument. E. Deanesly, F.R.C.S., Wolverhampton, in the *British Medical Journal*, p. 1041, 1911, says: "In spite of the obvious advantages of the extra-peritoneal route in operating on the ureter with, possibly, septic contents, there are some important drawbacks, and the question of adopting the intra-peritoneal route, which has been recently advocated by Mr. Sinclair White, deserves serious consideration. The objection to the extra-peritoneal route lies not so much in the depth of the wound and the relative inaccessibility of the ureter, when approached from the outer side, as in the great length of the incision through the abdominal muscles and the transversalis facia. However carefully these are sutured, there is invariably a large and troublesome ventral hernia, which may seriously in-

capacitate for work. On the other hand, a median abdominal section, however long, if properly sutured and not drained, may be guaranteed against hernia. In addition to this very important advantage, it is possible, through an ordinary median hypo-gastric incision, to palpate the whole course of both ureters, and by placing the patient in the inverted position, to inspect and operate on either ureter from a little below the kidney to the entrance into the bladder. By operating with the same precautions as one would adopt with the opening of the gall duct or intestine, there is no more risk of peritoneal sepsis, and if drainage is required, as is usually the case, it can easily be made entirely extra-peritoneal by closing the posterior peritoneal incision and bringing out the drain through a posterior or lateral incision, not entering the peritoneal cavity."

Sinclair White, senior honorary surgeon to the Royal Infirmary, and lecturer on surgery in the University of Sheffield, in the *British Medical Journal*, January 1st, 1910, has an exhaustive article on ureteral calculi. He says: "The *x*-rays have demonstrated that, contrary to the belief formerly held, calculi are found in the ureters more frequently than in the kidneys. Leonard, from a careful analysis of a series of cases, estimated the ratio as being two ureteral to one renal stone." White narrates two successful cases of his own, operated on by the trans-peritoneal method, and combats the adverse criticism he received from Morris and Freyer. In his argument he says that he can find but one death among those cases reported as having been operated on trans-peritoneally. He states the possible objections as resolving themselves into two: (1) fear of infecting the peritoneum; and (2) danger of urinary leakage subsequently. He refers to the success of Wertheim's operation for implantation of the ureters into the bladder, in advanced cancer, by the abdominal route, and points out that the ureter can be sutured almost as easily as the bowel, with infinitely less likelihood of it reopening from tension on the sutures. He thinks that nowhere could a better instance be found of surgical tradition standing in the way of progress. He points out the rational methods of meeting the various indications, as one would do in dealing with other intra-abdominal conditions,—temporary ligatures on the ureters to control flow, aspirating the ureter when distended as in pyo nephrosis or hydro nephrosis, and a careful technic to avoid soiling. The advantages of the trans-peritoneal route he sums up as: "It, and it alone, enables us to clear up doubtful diagnoses. It is a less difficult operation than any of the extra-peritoneal procedures. It ensures plenty of room and an abundance of light, and the operator

is able to carry out the steps it entails with little or no disturbance of the surrounding parts, and with an amount of precision quite unattainable by any other method."

W. J. Mayo, in the *Journal of Surgery, Gynæcology and Obstetrics*, June, 1911, gives a case of supra-pubic trans-cystic removal of calculi impacted in the vesical portion of the ureter. So he, too, is not allowing himself to be hindered by tradition.

It is known to you all, that surgeons are now boldly operating on the bladder, prolonging the opening upwards, and incising the peritoneal portion of the bladder to give additional room when needed. Modern technique makes this procedure safe. It is often expedient to attack a vesico-vaginal fistula, situated high up, by this method. The added risk is slight and the advantages great. The old fear of the danger from urine escaping into the peritoneal cavity during an operation, is not warranted by modern experience, but was based on the catastrophies of pre-aseptic days. In my first case, the lodgement of a pelvisful of urine did no damage, and the few frail adhesions found, showed the slightly irritating effects of the urine on the peritoneum, granting that all these adhesions were due to the urine and none to the mechanical irritations of the operation, from gauze packing, and manipulation.

It is hard to imagine that the weight of tradition can force one to adopt the atrocity of the sacral route, to reach the lower parts of the ureters, when modern surgeons are showing that the simpler, easier, and safer methods of trans-peritoneal or trans-vesical attack are available. I do not wish to leave the impression that the extra-peritoneal route should never be followed. The upper third of the ureter can well be reached by this method, and will perhaps require less perfect technique. But to illustrate by a simple case: A calculus has been shown by the *x*-rays to be lodged at the pelvic brim; to reach it by the extra-peritoneal route would require a long incision and extensive opening up of the retro-peritoneal tissues; if the urine is septic, you cannot avoid soiling the area, there is no way of keeping back the flow of infective material while operating, and it will be very difficult to suture the opening in the ureter effectually; also, as Deanesly has pointed out, a weak scar will result, with the probability of hernia.

On the other hand, by the trans-peritoneal method, the usual abdominal incision is made, the patient is placed in the Trendelenburg position, the bowels are packed off so as to obtain a good view, the ureter is controlled if necessary by a temporary ligature, the peritoneum and ureter are incised, and the stone extracted. The

ureter can now be easily and perfectly closed, the peritoneum sutured over it, and the abdominal wound closed in the usual manner, leaving a sound wound with no danger of hernia. If prudence suggests drainage, it can easily be provided for before the posterior peritoneum is closed, by making a stab-wound in the loin down to, but not through, the peritoneum, forcing the blades of a long pair of forceps down to the site of the incision in the ureter, and introducing a drain in this manner. This gives drainage with a minimum amount of opening up of the retro-peritoneal tissues. The posterior peritoneum can now be closed, and the operation finished as above outlined. The whole procedure seems too simple to be true, but I have every confidence that some such method will soon supplant the procedure at present employed.

THE Ontario League for Medical Freedom was organized March 12th, in the Foresters' Hall, on College Street, at a meeting at which some fifty citizens were enrolled as members. The chair was taken by Mr. R. Carswell. The aim and purpose of the league is stated to be the dissemination of the information pertaining to and to safeguard through education the rights of the people against unnecessary, unjust, oppressive, fraternal, and un-British laws ostensibly related to the subject of health. It opposes the granting of a monopoly of healing practice to any system of healing; demands the right to employ any practitioner or system; opposes the establishment of State medicine; the attempted use of sanitation and cleanliness as a cloak for compulsory medical treatment; discrimination in favour of any school of healing in selecting officers to enforce health regulations, and the use of public funds in furthering the propaganda of any system of healing, and proposes a campaign of education to establish the principle of medical freedom. The president is Mr. R. Carswell; vice-president, Mr. J. D. Nasmith, and secretary, Mr. C. R. Munro, 2217 Queen Street East. —*Toronto Mail and Empire*, March 13th, 1912.

Editorial

EPIDEMIC DISEASES IN CANADA

FROM all parts of Canada reports come to us of the prevalence of small-pox. The disease has been endemic for over a year, although the type was mild. The reports now indicate that it is becoming epidemic and that the type is growing virulent. In Champlain county and L'Islet there is a very severe outbreak, and there are centres of infection all the way from Montreal to Quebec, notably at St. Casimir de Portneuf and at Ste. Anne de la Perade. In the latter place ten per cent. of the inhabitants were infected, and this condition has continued for eight months. In all there have been three hundred cases, and all are traceable to a patient who had been sent from Quebec. From Eniskillen township, eight miles from Petrolea, the disease was reported on March 8th; from Grand Valley twelve cases in eight houses on March 2nd; from Regina seven cases on March 8th; from Edmonton nine cases as long ago as February 11th; in Hull five cases on a single street; at Rigaud twenty-five cases in one school on March 9th; in Ottawa twenty-five cases were in the hospital on March 4th.

For a month, according to the Lethbridge *Herald*, business was at a standstill in Magrath on account of the quarantine which was found to be necessary. In British Columbia three hundred and forty-six cases were reported from twenty-two different localities during the year. As long ago as November 24th, cases were discovered at Beauport and three months were allowed to pass without any remedial measures having been taken. During the past month over sixty municipalities in Quebec gave notice that the disease was prevalent within their borders. During February there were

seventy-three cases in Ontario, and there were even more than that in the corresponding month of last year.

The lumber camps in Northern Ontario and Quebec are badly infected, and cases are continually discovered upon the outcoming trains. According to the Kemptville *Advance* the chief magistrates of fifteen of the largest towns of the Ottawa Valley have signified their willingness to cooperate in a petition to the Ontario government that radical measures be taken to guard against the disease and to stamp it out when once it has procured a foothold. The concensus seems to be that a quarantine station or government hospital should be established at a point near North Bay, and the proposal is that there should be a thorough inspection of all men who have been working in the woods before they are allowed to come into more civilized communities. The mayor of Renfrew is outspoken in his opinion that the medical inspection in unorganized districts is carried on just as the lumbermen wish, and he deprecated the sending of medical students to do the work which should be performed by properly qualified inspectors.

The gravity of the situation is ill appreciated. In Ottawa a very efficient inspector was employed at a salary of one hundred and fifty dollars a month; but he was removed to make way for another who was willing to work for half the amount. The new inspector retained the position for twenty-four hours and then resigned.

In Quebec, at least, there is no need for laxity, as the law is very clear. According to article 3889 of the Code: "The Board of Health of the province, when for forty-eight hours after any order has been given by it to a municipal council, the same has not been executed, may, in urgent cases, upon being authorized thereto by two justices of the peace, cause its order to be executed at the cost of the municipality in default."

One comment runs through all the reports, and that is the almost total neglect of vaccination.

Typhoid fever appears to have been less prevalent than

in former years, excepting in British Columbia. A slight epidemic is reported from Selkirk amongst employees in the public works department of the government at Lockport. These men were engaged in excavating a new ship-channel, and as they worked in bulk-heads driven under the ice in sewage laden waters the origin of the disease is not far to seek. In the Citadel at Quebec an officer, a non-commissioned officer, a bugler, and a number of children are reported as suffering from typhoid. From Fleming in Saskatchewan and from Hamilton, Ontario, come reports of an epidemic outbreak of mumps. In Hamilton forty-eight cases were reported on March 2nd. Measles is prevalent in Glenella, Wolseley, Edmonton, and St. John, New Brunswick. In Montreal scarlet fever has obtained a firm foothold, and two distinct outbreaks occurred in Notre Dame Des Neiges College. On the first occasion the authorities were not notified, and the pupils were allowed to go home for the Christmas holidays with disastrous results. Local occurrences are reported at St. Andrews College, Toronto, and at Upper Canada College, although this condition is not unusual each winter. The epidemic appears to be most severe in the district around Yorkton, where it is associated with diphtheria. The Moose Jaw *News*, of March 2nd, remarks that "this outbreak indicates how futile are the present health laws of Saskatchewan." The difficulty throughout Canada is not the futility of the laws so much as the laxity with which they are enforced.

DR. J. C. CAMERON

THE profession of medicine sustained a profound shock by the death of Dr. J. C. Cameron, of Montreal, which occurred so suddenly on March 16th, as it was not known even to himself that his health was seriously impaired. Some months ago he discovered by accident that his blood pressure was unusually high; and upon advice he moderated somewhat

his daily work. Late on the night of Friday he had occasion to visit a patient during the heavy storm that prevailed. Upon his return he suffered from a cerebral hæmorrhage and death was almost instantaneous.

Dr. James Chalmers Cameron was the son of the late Rev. James Y. Cameron, of Niagara Falls, and was born at Aultsville, January 18th, 1852. He was educated at Upper Canada College, where he was head boy in 1870. In 1874 he graduated in medicine at McGill University, when he was final prize man. He was appointed house-surgeon at the Montreal General Hospital and remained until April, 1877. He then began a period of residence in the Rotunda at Dublin, and upon successive occasions studied in Berlin, Paris, and Vienna. Upon his return he was appointed to the chair of obstetrics at Bishop's College, and in 1886 became professor of obstetrics and diseases of children in McGill, a post which he held from that time till his death. As professor of obstetrics he was accoucheur-in-chief at the Montreal Maternity Hospital, and saw it grow under his direction out of humble quarters in St. Urbain Street to its present position as one of the largest and most influential institutions of the kind in Canada.

Many honours came to Dr. Cameron. He was president of the section on pediatrics at the pan-American Congress in Mexico in 1896, and in 1910 he became a fellow of the American Gynæcological Society. In addition he was a member of the Royal College of Physicians of Ireland.

For thirty-eight years Dr. Cameron was closely identified with masonry, and last month was elected an officer of the Grand Lodge of Quebec. He was master of a lodge in connexion with McGill, which was to have been dedicated March 29th. He was also identified with the militia service, and was surgeon in the Prince of Wales Fusiliers. Since 1884 he has been associated with St. Paul's Presbyterian Church. He touched life at many points. He was an ardent lover of music, and an excellent German scholar. He was a member of the Teutonic Club and was medical examiner for

the German Army. He wrote with an admirable style, and his pen was always at the disposal of the profession. To the *Montreal Medical Journal*, and to the CANADIAN MEDICAL ASSOCIATION JOURNAL he was exceedingly kind, and his wider contributions to medical literature are well known. He was an accomplished physician, and in the special branch of medicine to which he devoted his life he had no superior. His taste in literature was fine, and as a lecturer he was remarkable for his fluency of speech and lucidity of statement. With all he was genial, and to the young practitioner he was especially generous.

In 1880 Dr. Cameron was married to Elizabeth Dakers, of Montreal, who survives him. His mother, Mrs. James Y. Cameron, is living in Toronto. One son, Mr. Dakers Cameron, lives in Montreal. Other members of his family are two brothers, Dr. John W. Cameron, Buffalo, and Mr. W. A. Cameron, Toronto. He will be much missed by his patients, who were always his friends, by the faculty, and by the profession at large.

ONTARIO

MANY radical alterations in the Health Act of Ontario are contained in a new bill presented to the legislature by the Hon. W. J. Hanna. The province is to be divided into ten districts, with a great deal of the power centralized in the Parliament Buildings of Toronto.

District health officers, who are to be paid an annual salary nor exceeding $2,500, and $1,000 for expenses, are to be created; local boards are to be reduced in number; compulsory notification of tuberculous diseases is provided for; better inspection of meat is demanded, and altogether, many excellent reforms are suggested.

As might be expected, a great deal of controversy has arisen in the press, and while bitter criticism is offered in partisan and local quarters, on the whole, it is recognized that the bill is a distinct step in advance.

The Hon. W. J. Hanna may be described as the one member of the government likely to act continuously in the right direction, where great humanitarian schemes are at stake. He has clear vision, a big heart, a capable brain, coupled with force of character, which, ordinarily, is not hampered by the demands of political exigency.

Unfortunately, even he is not always able to stem the tide of this commodity which has forced him to place weak men in positions requiring strong occupants, and at times his enthusiasm has died prematurely, but the splendid achievements at the prison farm near Guelph have earned for him the admiration and applause of the whole province.

The new hospital bill, which he is bringing forward this session, is also worthy of commendation, as it ensures greater facilities for medical education, making it possible for the universities to demand clinical material at any hospital receiving government aid, and also enabling hospitals to collect a reasonable maintenance rate from any municipality furnishing indigent patients to its wards.

The Medical Council is still in the limelight and regularly receives hard knocks from the provincial press. Some of these are deserved, others are unfair; on the whole though, the consensus of opinion is that the status of medicine is being endangered by the council. The *Ottawa Citizen*, on March 22nd, devoted a column and a quarter to this body, and even the *Queen's College Journal*, makes a complaint of the most doleful description. The burden of the song is that so often made before; viz., the selfish interests of the men composing the council being placed before those of medicine. The *University Monthly* (Toronto), somewhat humorously suggests that "the council, it must be admitted, has had its ear to the ground, and has kept it there so persistently that, like the ostrich, its head has become so deeply imbedded in the sand that it cannot hear the rumbling of the coming storm."

The exorbitant fee charged students by this body comes in for bitter criticism on all sides. In the meantime, we trust that Dominion registration will receive proper recognition in Ontario.

VACCINATION IN ONTARIO

THE mayor of Toronto has intimated to the Board of Control that he does not believe in vaccination. This confession of faith was made in reply to a letter from Mr. H. S. Southam, of Ottawa, urging the Toronto city council to cooperate with the Ottawa city council in opposing the proposed revision of the Vaccination Act. The mayor is entitled to his own beliefs, just as an inmate of an insane asylum is entitled to the belief that he can jump from a window and ascend in the air. But the patient who should attempt to put his belief into practice would injure himself alone. A public official who interferes with the practice of vaccination is a menace to the community.

The occasion for this deliverance of opinion arose out of the bill which was introduced in the Ontario legislature on February 12th, by Mr. Hanna. The bill is known as the "Vaccination Act," and according to the summary in the *Globe*, contains two important changes. Sections sixteen and seventeen in the old Act have been omitted entirely. The first provided that it should be lawful for school trustees to enforce the production of a certificate of vaccination before allowing children to attend school. Section seventeen contained a provision that where it is deemed necessary by the medical health officer, owing to the presence of small-pox, he may require a certificate of vaccination from pupils attending high schools, colleges, and universities. These sections have been replaced by one making the provision uniform, the government considering that there is no reason why a distinction should be made between private and public schools, and that

the health authorities, and not the Boards of Education, are the proper authorities to control the situation, as they are charged with the duty of enforcing the health laws of the province. The penalty for violation of the Act is extended to one year instead of one month. Accordingly the control of vaccination of children would be taken away from school trustees and placed where it properly belongs, that is, in the hands of the health authorities.

THE VENTILATION OF SCHOOLS

THE astonishing discovery has been made that the most efficient means of ventilating a room is to open the windows. A report has been presented to the Toronto Board of Education by Dr. Charles J. O. Hastings, medical health officer, on the conditions of heating, ventilation, and general sanitation in each of the city schools. It represents investigations covering a period of about six months and discloses bad conditions of heating and ventilation.

Dr. W. E. Struthers, chief medical inspector of schools, declares in his report that the only solution of defective ventilation systems in the city schools, is afforded by the windows. He is supported in the theory by prominent health authorities, so we are informed by the *Globe* that the opening of windows forms the only adequate means of getting proper ventilation in schools. Mrs. Wise, who presides over a committee of women which for two years has been collecting information in regard to the condition of the public schools of New York, says there is nothing to take the place of direct communication with the open air, as in the old-fashioned practice of opening the windows.

Great discoveries are always simple, and we may now expect that children's bodies, at least, will no longer be poisoned by their detention in schools, whatever may happen to their minds.

ORGANIZATION IN ONTARIO

AN amendment to the legislation concerning the public health is now under consideration in Ontario. According to its terms the province will be divided into ten districts, each composed of five or more counties. The amendment will not fix the boundaries of the districts. That will be determined later, probably according to population, with the counties in each district grouped along the railway lines to allow the inspectors to cover the ground easily. Northern Ontario will likely be divided into two or three divisions, Temiskaming and the mining districts comprising one, and the rapidly developing territory to the west with Fort William and Port Arthur, Saulte Ste. Marie and Kenora probably making two more. The new provision will not apply to the larger cities which possess efficient health departments. The proposal is commended by medical men generally, and it is expected that it will meet with no opposition in the legislature.

UNQUALIFIED PRACTITIONERS

A BITTER attack was made in the legislature of Saskatchewan upon the medical Act in force in that province. Two members, J. A. Sheppard and George Langley, boldly opposed the authority of the Medical Council of the College of Physicians and Surgeons to set examinations qualifying for the practice of medicine. The discussion arose at the second reading of private bills to qualify Arsene Godin and J. H. A. Gravel as members of the College of Physicians and Surgeons. Mr. Sheppard contended that there was a country to the south-east of Moose Jaw into which fifty thousand people had come in the last five years, and that they were practically without physicians. It seems incredible that so large a population is without qualified physicians, considering how many graduate every year from the medical schools.

If such a state of affairs exists, the remedy is not to hand the people over to unqualified physicians, but to attract physicians under whose care the patients will be safe.

Dr. Thomson and Dr. Black, representing the College of Physicians, appeared before the committee and demonstrated the impossibility of awarding a license to men who were so completely unqualified. It appears that one of the petitioners had spent only one year at Laval University and a part of two sessions in an American college which has no recognized status in Canada. But all these troubles will be at an end when the Canada Medical Act is in operation, which, it is hoped, will be the case within the next few months. These private bills are the bane of the medical authorities, as few unqualified practitioners are so friendless that some member will not take up their cause, however flimsy it may be.

PUBLIC HEALTH IN TORONTO

DURING the last year the work undertaken by the department of health in Toronto has increased enormously. Some idea of what is being accomplished in the tuberculosis department may be gained from the fact that the six nurses have over eight hundred families under supervision, while in June, 1911, the number was only a hundred and twenty-six. The nurses in question fill a long-felt need in carrying instructions to the persons whom they visit, in keeping needy cases in touch with charity organizations, and in providing for the removal of advanced cases to proper institutions. All cases must be reported, and are subsequently kept in view. All houses vacated by tuberculous patients are disinfected. In the department of milk inspection, all inspectors are graduates of Guelph Agricultural College, who have taken the special course in milk and milk products. Their activity is shown by a fall in nine months from 80 per cent. to 15 per cent. in the number of samples of milk below the legal butter-fat

standard. It is believed that a new by-law, which is in process of enactment, placing the responsibility with vendors, will prove most valuable. The sending of veterinary inspectors through the country on educational campaigns to the farmers has also been an important influence in raising the standard of the city's milk. Much has been accomplished, too, in the department of slaughter-house inspection. The compulsory Dominion examination for all inspectors has been of value, while the hoped for establishment of a municipal abbatoir will be of equal importance.

THE PUBLIC AND THE HOSPITAL

A COMPLAINT was made before the Board of Health of St. Thomas, on behalf of the Ladies' Benevolent Society, that a patient, Mrs. Humphries, had received ill treatment from a nurse at the Amasa Wood Hospital. The members of the Board of Health appear to have sided with the ladies and agreed that an investigation should be made. This information is contained in the Woodstock *Express* of March 1st. Three days later an interesting comment upon this grave charge was contained in the St. Thomas *Journal*. At the regular meeting of the St. Thomas Medical Association, which was held on the previous Friday, the unpleasant situation received a full discussion, and a series of resolutions was passed, which we think worth transcribing:

"Resolved, that we, the medical men of St. Thomas, have had practically no complaints in recent years from patients as to their treatment while in the Amasa Wood Hospital, but, on the contrary, patients invariably report to us that they have been highly pleased with the attention shown them during their stay in the institution. Being in constant attendance, we maintain that the consideration shown, and the care given the patients, compares favourably with that of any similar institution in the province. And furthermore, we are

of the opinion, that in the past there have been citizens too anxious to circulate damaging reports without first thoroughly ascertaining the facts."

This is not the first occasion on which a great matter has been kindled by a very small fire, and we venture to suggest that in the end the physicians will have been found to be right in their judgement of the work done in this hospital.

NEW BRUNSWICK ASYLUM

THE sixty-fourth annual report of the New Brunswick Hospital for the Insane for the year 1911 has been issued by the superintendent, Dr. J. V. Anglin. At the close of the year there were 543 patients in the institution as against 531 during the previous year. The total number under treatment was 685 with a daily average of 540. The largest number of patients in the hospital at any time was 549, and the smallest, 530. During the year 148 cases were admitted; 77 were discharged, and 54 died. Since 1848, when the hospital began its existence, 7,245 cases have been received into the wards. Of these 2,874 were discharged as recovered; 1,211 as improved, and 2,830 unimproved. The total deaths numbered 2,324. From this it would appear that of all the cases admitted, over 56 per cent. left the hospital the better for their treatment. One-half of the patients admitted had been married and the total of all their children, so far as ascertained, was 286. In 60 per cent. hereditary taint was discovered. The recoveries were at the rate of 30·4 per cent. of the admission, which is below the average rate in that hospital, and this is accounted for by the large number of incurable forms of disease among the patients admitted. The duration of insanity prior to admission was under one month in 19 cases and under six months in 19 other cases. The mean age of recovery was 36 years. The average age of death was 54. Fourteen of the deaths occurred within a year of admission, but three patients

who died had been constantly in residence for over forty years. The oldest resident, a female patient, has been in the hospital since the year 1860, and there is a male patient in residence since 1861. Eight patients have been in the wards over forty years, and 86 patients have been sheltered over twenty years. The total outlay at the hospital was $83,942. The cost per head was $155.45.

Although the hospital is procuring its supplies at as low a price as possible, the cost of living has increased steadily. In ten years the contract price for beef has risen from $6.25 to $9.40; for butter, from 19 cents to 25 cents; for oat meal, from $3.60 to $5.25; for sugar, from $3.75 to $5.80; for flour, from $3.80 to $5.25. The hospital farm yielded products to the value of $14,879. This report is a model of what a report should be. It is full of interesting facts presented in an interesting way.

CORRECTION in table January, 1912, page 11: Column 7, read M--Mixed. Columns 9 and 10, read + Positive.

THE Treasurer of the Association has sent drafts to members covering the amount of fees for the calendar year. He ventures to hope for a prompt acknowledgment on the part of the members.

THE hardships sometimes involved in the conscientious fulfilment of his duty by the medical practitioner, are instanced in the case of Dr. J. Daves. Dr. Daves undertook a journey from Le Pas, Manitoba, to Cumberland House, a Hudson's Bay post in the north, where his services were required. During the journey Dr. Daves was severely frost-bitten, and, to add to their miseries, the sleighs on which he and his companion were travelling, crashed through the ice, and it was only with considerable difficulty that they were able to extricate themselves. Dr. Daves is at present in the St. Boniface Hospital at Le Pas.

THE February returns of the Provincial Board of Health in Ontario show a reduction of nearly 60 per cent. in the number of contagious diseases over the corresponding month of last year. The total number of cases was 719 with 130 deaths, compared with 1,766 cases and 224 deaths in February,1911. The reduction in the number of cases of scarlet fever was from 619 to 108; of diphtheria, 213 to 176. The small number of cases of typhoid fever is the most gratifying feature in the report, as the number decreased from 476 to 34. It will be remembered that in February of last year the epidemic in Ottawa was at its worst, but the present winter has gone by without any notable epidemic.

SIR E. P. MORRIS, prime minister of Newfoundland, has received a letter from Mr. W. D. Reid, president of the Reid-Newfoundland Company, offering to build on a site provided by the government at St. John's, a sanatorium or hospital for tuberculous patients, to cost about $50,000, and, when fully finished and equipped, to be handed over to the government for management and control by them. In addition, Mr. Reid will undertake to build on sites provided by the government, a sanatorium or hospital in each of the sixteen electoral districts, each to cost about $3,000, and all to be handed over to the government for management and control, after full equipment. Sir E. P. Morris, in thanking Mr. Reid on behalf of the people of Newfoundland for his munificent offer, said that "this splendid manifestation of liberality and sympathy will do much to quicken public interest in the movement, and will assist the government materially in making the battle against the white plague one eventually to be crowned with the fullest success."

VERY satisfactory reports come from the town of Timmins, a Porcupine settlement. A new hospital has been commenced, a board of health is to be organized immediately, and every

care taken to ensure good sanitary conditions for the growing community, and pure water is to be secured from the base of the surrounding highlands.

In the annual report of the British Columbia Board of Health, Dr. Fagan, of Victoria, draws attention to the imminent danger from infectious diseases, owing in great part to the position of the province as a maritime country, and to the absolute necessity of notifying the Provincial Board of Health of any cases of infectious disease among persons arriving in the country. He speaks, particularly, of the difficulty of dealing with epidemics of small-pox, owing to the frequent lack of any marked symptoms until the disease is fairly established; and he emphasizes the consequent necessity for vaccination. He also speaks at some length of the use of antitoxin in cases of diphtheria, and points out that, whereas the death rate was formally about 48 per cent., it now varies from 9·5 to 11 per cent., this amelioration being due, for the most part, to the use of antitoxin. In connexion with this question, Dr. Fagan speaks of the great danger to individual life resulting from the supply of impure antitoxin, which is constantly being placed on the market. He recommends very strongly the establishment of a government laboratory for the manufacture of sera and particularly of antitoxin. The product would thus be made cheaper and, a still more important point, the purity and potency of the antitoxin would be assured. Three hundred and sixty cases of typhoid fever were reported during the past year. There is, however, every reason to believe that the number of cases was considerably in excess of that stated. The death rate was 28 per cent. The deaths from tuberculosis numbered three hundred and twelve. Dr. Fagan, in conclusion, makes certain recommendations in regard to the sanitation of the city, and speaks particularly of the evils existing in the logging, railway, and mining camps in the vicinity. An inspector, Dr. Davis, has now been appointed to take charge of this branch of work.

Books Received

The following books have been received, and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

INFECTIONS OF THE HAND. By ALLEN B. KANAVEL, M.D., with 133 engravings. Lea & Febiger, Philadelphia and New York.

TRANSACTIONS OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION, Vol. XXVII, 1911.

STUDIES IN PSYCHIATRY, Vol. I, by Members of the New York Psychiatrical Society. The Journal of Nervous and Mental Disease Publishing Company, New York.

STUDIES IN PULMONARY TUBERCULOSIS. By F. G. GRIFFITHS, B.A., M.D. Baillière, Tindall and Cox, London.

THE PRESCRIBER. Edited by THOS. STEPHENSON, F.R.S.E., F.C.S. Vol. V. The Prescriber Offices, Edinburgh, 1911.

DIAGNOSIS AND TREATMENT OF SYPHILIS. By CARL H. BROWNING, M.D., and IVY MCKENZIE, M.A., B.Sc., M.B., CH.B. Lea & Febiger, Philadelphia and New York, 1912.

TREATISE ON TUMOURS. By ARTHUR E. HERTZLER, M.D., PH.D. Illustrated with 538 engravings and 8 plates. Lea & Febiger, Philadelphia and New York, 1912.

TUMOURS OF THE JAWS. By CHARLES L. SCUDDER, M.D. Cloth, $6.00 net; half morocco, $7.50 net. Philadelphia and London: W. B. Saunders Company; Toronto: J. F. Hartz Co., Ltd. 1912.

MODERN METHODS OF NURSING. By GEORGIANA J. SANDERS. Cloth, $2.50 net. Philadelphia and London: W. B. Saunders Company; Toronto: J. F. Hartz Co., Ltd., 1912.

Men and Books

By Sir William Osler

IX. The Funeral of Lord Lister. I have just come from the Abbey service,—the most splendid tribute ever paid to our profession, and so richly deserved in the person of Joseph Lister, one of the greatest benefactors of humanity. Voltaire saw Newton buried like a king in the same Abbey, and ever after esteemed it one of the glories of England that she was able to recognize the supreme merits of a king among men. To-day's ceremony was England's tribute of heart and head. The nation's Valhalla was packed to the doors; nurses, students, doctors, and the general public crowded in the nave, while the reserved seats of choir and transepts were thronged with a gathering of representatives from all parts of Europe. As one of the delegates from the University of Oxford I had a choir seat, which chanced to be next to our own Chancellor, Lord Strathcona. The recognition of the international character of Lord Lister's work was witnessed by the presence of nearly all the foreign ambassadors, and representatives of the Académies des Sciences of Russia, Sweden and Norway, Spain, and Rome. Among those who occupied seats were the Prime Minister, and many of his colleagues, Lord Lansdowne and the Duke of Northumberland. Opposite to me was a group of Lister's old Glasgow and Edinburgh pupils —Macewen, Caird, Littlejohn, Bramwell, Balfour, Playfair, and others.

Just before 2.30 p.m., after the organist had finished playing Chopin's "Funeral March," there was heard at intervals a distant voice, high above the silence. At first the impression was of some one singing outside. I was waiting for it, having had a few years ago, at the funeral of Lord Kelvin, the same experience. The choir coming through the cloisters sang the hymn, "Brief Life is here our Portion," and the high note at the end of the third line alone reached us in the clear, liquid voice of one boy. For three or four verses this was heard without another note of the full choir (the sound of which was not audible until the last verse), which finished just as the procession entered the Abbey. Preceded by the canons, the coffin was borne through the nave and choir covered with a purple pall and on it a magnificent wreath of orchids sent by the German

Emperor. The pall-bearers were Lord Rayleigh, Lord Rosebery, Lord Iveagh, president of the Lister Institute, the president of the Royal Society, the principal of Glasgow University, the president of the Royal College of Surgeons (Mr. Godlees, Lord Lister's nephew), Sir Watson Cheyne, and Professor Caird. Immediately following the family was a group of foreign delegates, MM. Chauveau, Dastre, and Pozzi from Paris; Garré, president of the German Congress of Surgeons, and Treub from Holland. Professor Chauveau, who must now be the *doyen* of French science, was a very striking figure with his fine face and head, and long white hair. It was a noble and ever-to-be-remembered occasion. And was ever Handel's grand anthem sung more fittingly?

"When the ear heard him then it blessed him; and when the eye saw him, it gave witness of him. He delivered the poor that cried; the fatherless and him that had none to help him. Kindness, meekness, and comfort were in his tongue. If there was any virtue and if there was any praise, he thought on those things. His body is buried in peace, but his name liveth evermore."

Only those who have lived in the pre-Listerian days can appreciate the revolution which has taken place in surgery. In the seventies at the old Montreal General Hospital we passed through it, and it is pleasant to recall that when Dr. Roddick returned from Lister with the technique there was no opposition, but the surgeons patiently practised a laborious and unnecessary ritual for the sake of the better results. As with everything that is worth preserving in this life there has been evolution, but from the great underlying principle on which Lister acted there has been no departure.

I wonder how many surgeons have taken the trouble to work through the literature of the growth of the method as given in Lister's writings? It is now available, and no surgeon's library is complete without these splendid volumes, published a few years ago by the Oxford Press—a worthy monument for the greatest Englishman of his generation.

Retrospect of Surgery

The Differential Diagnosis Between Gastric Ulcer and Carcinoma; the Pathological Anatomy of these Diseases in Relation to their Radiographic Appearance.

THE use of radiography in the diagnosis of gastric disease is a most important advance. As its value was, however, at first overstated and later underestimated, an attempt is made in a recent paper by Prof. Dr. V. Schmieden to show its true worth. (*Archiv. fur klinische Chirurgie*, Band 96, Heft 2.)

Since the appearance of Schmieden and Härtel's publication in 1909, they have been constantly at work upon this subject, employing the rich material from Professor Bier's clinic. Many hundreds of cases have been examined and thousands of plates taken. Schmieden insists that radiography should not supplant, but rather supplement, the physical and chemical methods at present employed in the diagnosis of gastric disease. Often, however, fluoroscopic examination and *x*-ray plates render a diagnosis much more accurate, and in some cases a diagnosis is possible only by such aids. Further, not only may one look to the *x*-ray picture for a differential diagnosis, but one may also conclude from it whether a case is still operable or not. By means of radiography an early diagnosis should be possible, as in Schmieden's hands a series of small, still operable, but not yet palpable, tumours in the region of the pylorus were detected. Indeed, Schmieden considers that exploratory laparotomy should rarely be necessary for diagnostic purposes, but should be practised principally to determine whether a tumour already diagnosed and localized should be operated upon or not. A further advantage of this method is that it leads to a quick decision and renders unnecessary observations which may be extended over weeks.

In this branch of the diagnostic science one hears sounded again the cry which accompanies the diagnosis of cancer wherever met with in the body,—the cry that one meets with but few cases of carcinoma in the early stage. The reason for this is not fear of operation but is to be found in the prolonged, latent stage of the disease.

Stiller and certain other internists have disapproved of the use of radiography in the examination of the stomach, claiming that the bismuth *x*-ray picture is but a caricature of the stomach. These authors fail to recognize that inflation with air yields an even greater caricature and a condition which practically never exists in the stomach. Radiography effects the same result as air inflation in determining the position, form, size, and relation of the stomach to surrounding parts and to palpable tumours; moreover, it permits a functional test of the stomach and gives a graphic profusion of detail which cannot be obtained from air inflation. According to Stiller, one should avoid air inflation in all ulcerous processes (round ulcer, breaking down carcinoma), which means that the method can be employed only in a minority of the cases. In Schmieden's opinion the two methods cannot be compared.

Schmieden's method of examination is based upon that practised by Holzknecht. The patient is first given two drachms of bismuth suspended in two ounces of water, and its entrance into the stomach observed with the fluoroscopic screen. This heavy suspension is seen to flow rapidly along the lesser curvature towards the pylorus and to settle in the most dependent portion of the stomach. Any interruption in the downward flow is readily noted. Next, a mixture of bismuth and bread and milk or porridge is slowly eaten by the patient, and observations with the screen are made from time to time. During these observations the patient should be provided with a back seat rest in order that palpation may be carried out and the screen pressed firmly against the anterior abdominal parietes. Upon sheets of glass placed in front of the screen the outline of the stomach and changes in its contour are drawn rapidly in pencil. Subsequently paper tracings are made from these plates for permanent record. Finally, one or more photographic plates are taken to show the fixed alterations in the stomach contour. With all respect to the purely screen method developed by Holzknecht, Schmieden never omits the taking of a plate. Apart from its didactic worth, the significance of the plate picture is further increased the finer the details one is able to bring out for subsequent observation. It is further urged that the plate picture, if taken at the proper time, is a relatively simple radiological aid in diagnosis, whereas the fluoroscope is used with facility only by those having a special training.

The numerous illustrations contained in Schmieden's paper are selected to show the characteristic radiographic features of gastric ulcer and cancer, and impress one with the fact that one has to deal,

not with accidental forms, but with differences of form which have their foundation in pathologico-anatomical and pathologico-physiological processes. The underlying causes of change in form give rise each to characteristic alterations in the contour of the organ. Thus, shrinkage of the stomach from carcinoma and contracture from ulcer give totally different shadow pictures, and in these variations lies the possibility of a differential diagnosis. Peptic ulcer of the stomach, for instance, results, first, in the formation of a flat cavity of the inner wall, the alteration in the contour being generally so insignificant as to yield at this stage no appreciable change on *x*-ray examination. The relation of spasm to ulcer is here, however, graphically depicted. Even a superficial ulcerative lesion of the lesser curvature may, through irritation of the circular fibres of the stomach, give rise to a marked indentation, resembling an hour glass constriction of the greater curvature. In such cases the detection of a tender point in the line of the lesser curvature opposite the apex of the constriction is considered by Schmieden conclusive evidence of the presence of ulceration. Such spasmodic deformity of the stomach may be observed for twenty minutes or longer under the fluoroscope, and is pathognomonic of florid ulcer. The administration of atropin hypodermically diminishes the extent of the spasm, but it is abolished only by general anæsthesia. These cases, in Schmieden's opinion, are included among those which at operation show nothing abnormal, are closed without internal exploration of the stomach, and are classed as hysterical, in spite of the recurrence of severe pain and vomiting,—the direct results of the existing spasm.

In the absence of spasm and the symptoms resulting therefrom, such an early flat ulcer fills and empties as does the remainder of the stomach, leaving no bismuth rest at the seat of disease and, therefore, no abnormal shadow. The further pathologico-anatomical changes resulting in free perforation are not, of course, subjected to radiographic investigation.

Of greatest interest are those cases in which slow destruction of the gastric wall is attended by the formation of adhesions between the stomach in the neighbourhood of the ulcer and the liver, pancreas, spleen, abdominal wall, mesocolon, omentum and gall bladder —less frequently the large bowel, duodenum, and diaphragm— terminating in what Schmieden designates as a "penetration." In these cases there exists a callous thickening of the stomach wall, which is essentially perigastric. Into the recesses of such a perforation cavity the bismuth meal penetrates, and remains as a deposit

even after the emptying of the stomach. The penetration cavity may communicate with the stomach only by a very small opening. An air vesicle occupies its dome.

In chronic ulcer then, in distinction from carcinoma, there are marked inflammatory changes in the surrounding tissues and organs, and the ulcer tumour consists more or less of an inflammatory mass. In this way a palpable ulcer tumour is comparable to the inflammatory conglomerate tumour of chronic appendicitis. Again, in distinction from carcinoma, one sees radiologically in ulcer cases healthy stomach wall with peristaltic action extending up to the diseased area. On filling the stomach with bismuth, the walls rapidly expand. In carcinoma, on the contrary, peristalsis and radiographic deformity due to spasm are absent. In carcinoma the small, contracted, frequently funnel-shaped stomach, with defective contour, stands diagnostically opposed to the large, dilated stomach with well defined outline met with in ulcer—the dilatation of the latter being due generally to associated spasm of the pyloric sphincter. Characteristic, too, of new growth in the stomach wall is the abrupt failure in the bismuth shadow, generally to be seen in the pyloric region. In this location, also, one frequently sees in cancer a faint extension of the dense, bismuth shadow in coral-like branchings. Finally, the presence of a shadow in the course of the œsophagus, indicating regurgitation, speaks strongly for carcinoma rather than ulcer.

In support of the value of radiography in the diagnosis of gastric disease, it should be stated that Schmieden was able with the aid of combined stomach examination and radiography to make a correct diagnosis in all but one of the cases reported.

Schmieden concludes with the dictum that a modern, scientific worker in the field of gastric diagnosis should never make a diagnosis upon the radiographic picture alone, nor should he undertake a difficult gastric diagnosis without an *x*-ray examination.

Obituary

Dr. J. S. Munger, of Rodney, died of heart failure on March 13th. He was eighty-one years of age.

Dr. Walter Wells, of Waterloo, died March 10th. He was seventy-nine years of age.

Dr. L. L. Palmer died at his residence in Grimsby as the result of a paralytic stroke. He was one of the most distinguished medical men in Toronto, where he practised as an ear, eye, and nose specialist for many years. He was surgeon lieutenant-colonel of the Queen's Own Rifles for fourteen years, but retired from the regiment about five years ago. Dr. Palmer gave up his practice a year ago and went to Grimsby to live. He was sixty-five years of age.

Dr. J. B. Menzies, of Lachute, died from heart failure, brought on by over-exhaustion. He was summoned to visit a patient at Harmington, twenty-five miles distant. After driving fifteen miles, his horse became exhausted, and Dr. Menzies and his man determined to push forward on foot. After covering two miles, however, Dr. Menzies collapsed. His man hurried back for help, but on returning found the doctor dead. Dr. Menzies was a graduate of McGill and had practised in the district of Lachute for twenty-five years.

Dr. Robert Murray, of Woodstock, died February 24th, in the seventy-seventh year of his age. He was born in 1836 and practised medicine in Woodstock for the last twenty-five years.

Dr. Walter Taylor died in St. Catharines, February 13th, from acute pneumonia. Dr. Taylor was born in Dunnville in 1871, and was a graduate of the University of Toronto in 1899.

Dr. Frank J. Durocher died at Ecorse in February, in the thirty-eighth year of his age after a brief illness. Dr. Durocher was a graduate of Detroit Medical College, and had practised in Ecorse for nine years. His death was hastened by his exertions during the epidemic of scarlet fever amongst his patients.

Dr. J. W. Wright, of Picton, died February 29th, in the fifty-eighth year of his age after a short illness caused by pneumonia. Dr. Wright was a graduate of McGill in the year 1878, and was for many years medical health officer of the town in which he practised.

Dr. Frederick S. Yorston, of Truro, died on February 25th at Miami, Florida, where he had been spending the winter to regain his health. Dr. Yorston was a graduate of McGill University of the year 1890, and was one of the most highly valued physicians in the Maritime Provinces.

Dr. Thomas C. Scholfield died at Toronto, March 1st, in the seventy-ninth year of his age. The greater part of his professional life was spent in Bond Head and Thorn Hill.

Dr. Calvin Brooks McQuesten died suddenly at Hamilton on February 19th. He was the eldest son of the late Calvin McQuesten, M.D., and was born in Hamilton in 1837. He remained there until he entered Dartmouth College, where he took his degree in medicine. Before the outbreak of the civil war Dr. McQuesten joined the federal army as a surgeon and served throughout the war. At the close of the war he entered upon private practice in New York, where he remained until forced to retire on account of failing health.

Dr. George D. Maxwell, of St. Thomas, died February 29th in Porters, Texas, where he had gone in search of health.

News

The typhoid fever epidemic in Port Hope is becoming serious. Twenty-seven cases of the disease are reported. Measures are being taken to determine the cause of the outbreak.

Hamilton Road School, Dundas, is closed on account of an outbreak of scarlet fever. The epidemic of this disease in Walkerton has now been practically stamped out.

Seven cases of small-pox are reported from Regina, Saskatche-

wan. All the cases are strictly quarantined. An outbreak of smallpox is also reported from Winchester.

An attempt to better the health of the children attending the public schools of Owen Sound is being made by Dr. G. H. Murray. For the next six months, all children who appear to be in any way physically defective will be examined and steps taken to remedy the evil. Dr. Murray has generously offered his services gratuitously during this trial period. At the end of the six months, if it is thought advisable, a permanent medical inspector will be appointed.

The St. John Ambulance Association gave a demonstration of its work at the Russell Theatre, Ottawa, before Their Royal Highnesses, the Duke and Duchess of Connaught, and the Princess Patricia. The programme consisted of addresses by His Royal Highness and Dr. Montizambert, president of the Canadian branch of the association, the presentation of certificates of proficiency to members in Ottawa, and a competition between the eastern and western first-aid winners of the Canadian Pacific Railway system. Stereopticon views of first-aid work were shown and explained by Colonel G. Carleton Jones, director general of medical health. An address was also given by Mr. Harold Boulton, M.V.O., of London, England. The competition between the eastern and western sections of the Canadian Pacific Railway—Montreal and Winnipeg—evoked great interest, the westerners being victorious and, consequently, the recipients of a handsome cup presented by Mr. W. R. Baker.

An association of physicians has been formed in Western Manitoba. The officers elected are: Dr. J. S. Matheson, president; Dr. L. M. More, vice-president; Dr. H. Oliver McDiarmid, secretary-treasurer. The executive committee consists of Dr. Latimer and Dr. Hicks, of Brandon, and Dr. Clingan, of Virden.

Dr. Wesley T. Rich, medical officer of health for the township of Melancthon, has been unsuccessful in his action against the Board of Health. The claim in question amounted to thirty dollars, and was for expenses incurred in disinfecting two houses after quarantine had elapsed.

Some difference of opinion was expressed at a meeting of the Board of Education in Hamilton, in regard to the new Health Act,

by which the medical health officer is given the right to enforce compulsory vaccination.

THE university of Toronto has received from Mrs. William Freeland the gift of an endowment for a fellowship in anatomy in memory of her father, the late Dr. James H. Richardson, who for many years was professor of anatomy in the Toronto School of Medicine and the University of Toronto. The fellowship is to be known as the James H. Richardson Research Fellowship in Anatomy, and is of the value of $500. It is open to graduates of recognized universities and medical colleges, and to students of the University of Toronto who have completed the third year of the medical course in that institution. The holder of the fellowship will be required to devote his entire time during the tenure of the fellowship to investigation in anatomy under the direction of the professor of anatomy in the University of Toronto.

AT a meeting of the Port Arthur Board of Health, held on March 6th, a resolution was passed that physicians report any contagious diseases to the medical health officer, or to the Board of Health, within twenty-four hours.

SMALL-POX in Regina is assuming alarming proportions. Several fresh cases have been reported and a serious epidemic is feared, despite all precautionary measures.

SCARLET FEVER is still very prevalent in St. John's, Newfoundland. Fifty-six persons are at present suffering from the disease.

TWENTY-NINE cases of typhoid are reported from Port Hope. Dr. McCullough is in charge of the outbreak, which, it is feared, may be a serious one.

AN epidemic of scarlet fever and diphtheria is reported from Rhein, Sask. Five deaths occurred and fifty or sixty people are suffering from one or other of the diseases. An outbreak of diphtheria is also reported from Espanola, Ont. At Midland, Ont., the schools are closed, owing to an epidemic of scarlet fever.

FROM St. John's, Newfoundland, come reports of an outbreak of scarlet fever, twenty-five people being stricken with the disease. A case of small-pox has also been reported in that city.

THE new site for the Toronto Hospital for the Insane at Whitby consists of six hundred and twenty-five acres of rich land on the lake front. Situated as it is, extending from the harbour on the south to the railway station on the north, every facility is provided for approach, both by water and rail. Plans are in the hands of the provincial secretary, and it is expected that building operations will commence immediately.

THE new pathological building of Toronto General Hospital is open and work is in progress. The space in the medical building vacated by the department of pathology, bacteriology, and pathological chemistry is rapidly being taken up by the department of physiology.

DR. G. STERLING RYERSON, founder of the Canadian Red Cross Society, has been appointed representative of the Canadian government at the Ninth International Red Cross Congress to be held at Washington from May 7th to 17th.

ON April 1st work is to commence on an addition to the Hospital for Sick Children in Toronto. The new building will consist of an out-patient department, an infectious department, and a pathological department, while the top floor of the present building will be utilized for the installation of a complete new operating suite. The alterations will cost altogether about $250,000.

DR. G. M. BOWMAN, of Regina, has given up his practice and he has been succeeded by Dr. Connell, of Indian Head.

DR. R. B. WHITE, who was recently appointed medical officer to the Kettle River Railway Company, has opened a small hospital in Merritt, where the men will be cared for who may happen to be injured on the construction work.

Dr. A. A. King, the retiring medical health officer at Ladner, has presented his annual medical report. During the year there were two cases of diphtheria, fourteen of scarlet fever, six of smallpox, five of typhoid fever, ten of whooping cough, and six of tuberculosis. In every case prompt measures were taken to prevent the spread of the diseases.

THE Kingston Medical Society has appointed a committee to

prepare a schedule of fees. It is expected that the fees will be from 25 to 50 per cent. in excess of the antiquated scale which is now in existence.

A MILITARY medical camp will be held in London early in June. All the ambulance field units and divisions one, two, and three, will be gathered there for inspection. There are about eight hundred men in these units, and in addition there will be about eighty physicians from all parts of the province. Colonel Jones, of Ottawa, will be in charge of the camp of instruction.

ACCORDING to the fifth annual report of Dr. P. A. McGarry, health officer for Canso, the health of that town appears to be remarkably good. Only one case of diphtheria is reported, and one of tuberculosis. Dr. McGarry remarks that the citizens are making great progress in combating the progress of all infectious and contagious diseases, and that they are the first to report them to the authorities.

ACCORDING to the report of the Brandon General Hospital for January, one hundred and forty-two patients were admitted during that month and one hundred and twenty-seven were discharged. The medical staff was increased from eight to twelve, and for the year it will be as follows: Drs. E. C. Beer, A. T. Condell, J. H. Edmison, M. S. Fraser, J. McDiarmid, L. M. More, J. S. Matheson, C. P. Templeton, W. O. Bigelow, A. Lawther, A. S. Sharpe, and T. J. Anderson. Specialists (eye, ear, nose and throat)—Drs. G. H. Carlisle, V. E. Latimer, A. O. McDiarmid. A regulation was put in force to the following effect: "That before a patient suffering from tuberculosis or any other contagious or infectious disease, on which there is any doubt, can be admitted to the hospital, the case shall be submitted to three physicians, one being the physician attending the patient, one the hospital doctor for the month, and the third to be chosen by these two.

DR. J. F. ADAMSON has left Innisfrae to begin the practice of medicine in Edmonton.

FROM the latest edition of the Canadian Osteopaths' Directory, it would appear that there are sixty-three persons qualified to engage in osteopathy; that is to say, they have taken a course in some institution in the United States.

Dr. A. B. LeMesurier, of the staff of the Sick Children's Hospital, Toronto, passed the competitive examination of the Bellevue Hospital at the head of the list. Dr. R. A. Jamieson, of Toronto, stood second. This earns for Dr. LeMesurier the appointment of house surgeon at Bellevue. He is a graduate of the University of Toronto in 1910. Dr. Jamieson will join the Bellevue staff in July next. Forty-four candidates competed for this position.

A proposal to amend the medical act of the province of Quebec so that bone setters might be allowed to practise their art was defeated on February 29th, after a discussion which lasted three hours, by a vote of thirty-two to twenty-three. The Premier stated that while he knew there was a great deal of popularity to be gained by supporting the motion and the bill, he was against them, because it was a question of giving to the medical profession the same protection which the other professions enjoyed. At present prosecutions were chiefly in the hands of the Medical Association, and actions were never taken in cases where real good had been accomplished.

Dr. W. R. Morse, McGill '02, late of Providence, R.I., who is a medical missionary of the American Baptist Foreign Missionary Society, is at present at Hankow, China, temporarily in medical and surgical charge of the International Hospital.

The report presented to the Board of Control in Montreal by Dr. Laberge, medical health officer, on February 27th, showed that out of a total of 59,685 children examined by the municipal health authorities during the past year, 27,349, or almost 50 per cent., were found to be in an unhealthy state. Of this number, 19,843 were suffering from diseases of the mouth, defective and decayed teeth, and gum affections. Of the remaining 8,000 or more, 1,416 had to be sent home from school; 2,140 children were found to be not vaccinated. Notices to have their children immediately looked after by their family physicians were sent in 20,028 instances, while 634 children had to be specially treated for bad eyesight.

At the Montreal General Hospital in 1911 the total number of indoor patients treated to a conclusion was 4,146, an increase of 500 over the previous year, and the largest number treated in any year in the history of the hospital. Of this number 303 remained over from last year; 4,170 were admitted during the year, and 215

remained in the hospital at the end of the year. There were discharged from the hospital 3,843, and there died in the hospital, 303. The mortality was 7·3 per cent., or 4·1 exclusive of deaths occurring within three days of admission. The average number of days in the hospital per patient was 18·42, and the aggregate number of days in the hospital by all patients was 76,371, an increase of 1,345 as compared with the previous year. The average daily cost per patient was $2.14. Of the indoor patients treated to a conclusion, there were 2,600 males and 1,546 females, making a total of 4,146. There were 2,691 non-pay patients, 651 public pay patients, 307 private patients, and 496 semi-private patients. Of the 4,146 treated, 2,025 were natives of Canada; 1,125 of the British Isles; 248 of the United States; 218 Russians; 150 Italians, and 320 divided among twenty-two nationalities. In the out-patient department, the total number of new patients treated was 14,511; the total number of consultations was 60,687, an increase of 1,004 over the previous year. Twenty-five nurses received diplomas during the year, making a total of 383 that have passed through the training school since its establishment.

At the annual meeting of the Waterloo County Medical Association, held February 27th, the following officers were elected: president, Dr. D. J. Minchin, Berlin; first vice-president, Dr. C. T. Noecker, Waterloo; secretary, Dr. J. E. Hett, Berlin; treasurer, Dr. T. H. Kalbfleisch, Berlin. Dr. MacKenzie, of Toronto, addressed the association on the subject of infantile paralysis.

MILITIA MEDICAL OFFICERS

The association of medical officers of the militia of Canada in session at Ottawa, February 29th, elected the following officers: honorary president, Colonel Hughes, minister of militia; honorary vice-president, Lieut.-Col. E. Fiset, Ottawa; honorary second vice-president, Col. G. C. Jones, Ottawa; president, Lieut.-Col. A. T. Shillington, Ottawa; first vice-president, Lieut.-Col. Fotheringham, Toronto; vice-presidents, division I., Major D. H. Hogg, London; division II., Lieut.-Col. D. W. MacPherson, Toronto; division III., Major J. W. Shillington, Ottawa; division IV., Major E. Pelletier, Montreal; division V., Major W. H. Delaney, Quebec; division VI., Lieut.-Col. J. Ross, Halifax; district X, Major T. Watt, Winnipeg; district XI., Major F. C. MacTavish, Vancouver; district XIII., Major L. S. McKidd, Calgary; secretary, Captain

G. H. Leggett, Ottawa; assistant secretary, Lieut. Neil McLeod, Ottawa; treasurer, Capt. F. M. Bell, Ottawa.

THE HEALTH OF TORONTO

Dr. Hastings, medical health officer of Toronto, has issued his annual report. During the past year 104 dwellings were condemned as unfit for human habitation. Of these 75 were pulled down, and the others were remodelled. Of 45 lodging houses only 4 were found to be in a satisfactory sanitary condition, and 10 were ordered to be closed. Under the order that all cases of tuberculosis should be reported, 1,154 cases were recorded. Of these, 814 cases, comprising 750 females, are under the supervision of the assistants of the department. In the laboratories 21,881 specimens were examined in addition to many tests of the municipal water supply. It is satisfactory to note that no bacilli coli communi have been discovered since the water has been filtered and treated with chlorine. Dr. Hastings reports that 29,171 cattle, 57,222 sheep, 23,611 swine, and 12,345 calves were slaughterd in the city during the year, but that only 9,323, or 7 per cent. of the total, were slaughtered under inspection.

ONTARIO MEDICAL ASSOCIATION

The following is the programme of the Ontario Medical Association, which will begin its meeting in Toronto on May 21st and continue until May 23rd: Symposium on Headaches—Ætiology and Classification—Treatment; medical, surgical, and ophthalmological aspects. The surgical aspects will be dealt with by Dr. Middleboro, of Owen Sound.

In the afternoon there will be meetings of sections, and in the evening the president's address will be given. After that an illustrated lecture on experimental medicine will be given by Professor Alexis Carell, of the Rockefeller Institute. Refreshments will be served in the Convocation Hall.

On Wednesday clinics will be given in the university buildings and luncheon in the quadrangle. In the afternoon the sections will meet and a garden party will be held. The evening will be devoted to the address in surgery and to a symposium upon exophthalmic goitre. The ætiology and pathology will be discussed by Dr. W. T. Connell, of Kingston, and the surgical treatment by Dr. Ingersol Olmsted, of Hamilton. The discussion will be opened by Dr. A. T. Shillington, of Ottawa.

On Thursday, May 23rd, the morning will be devoted to clinics at the various hospitals and in the evening the annual dinner will be held at 7 p.m.

Canadian Literature

ORIGINAL COMMUNICATIONS

Canada Lancet, March, 1912:

Ulcer of the Stomach and Duodenum . W. J. Macdonald.
Imperforated Rectum . . . . . John Ferguson.
Appendectomy on Shipboard . . . . . E. Bryceson.

Le Bulletin Médical de Québec, December, 1911:

Notes sur un porteur chronique de vibrions cholériques . Prof. J. G. Adami, Prof. A. Vallée, Dr. G. E. Martineau.
A. P. M. IXe session d'études.
Le XIIe Congrès de médecine et l'Association des Médecins de langue française . Dr. A. Vallée.

The Canadian Journal of Medicine and Surgery, March, 1912:

The After Treatment of Nose, Throat and Ear Operations . . . . . Perry G. Goldsmith.
An Unusual Case of Recurring Hæmoptysis Due to a Small Aortic Aneurism . H. B. Anderson.

Le Journal de Médecine et de Chirurgie, February, 1912:

L'Enseignement Médical aux universités d'Europe et d'Amérique.—En France: II. Les Ecoles Médicales de Lille.—L'organisation de l'Université Libre de Lille . . . . . Eugène Saint Jacques.
La mort apparente et la mort réelee . J. J. Desroches.
Le traitement des tuberculoses osseuses et la correction des difformités à Berck-sur-Mer. Les prof. Calot et Ménard . . . . . Eugène Saint-Jacques.
Le traitement de l'éclampsie. . . . J. Jeannin.

Medical Societies

TORONTO ACADEMY OF MEDICINE

THE general meeting of the Toronto Academy of Medicine, held on March 5th, was addressed by Professor Richard M. Pearce, of the University of Pennsylvania, on the subject of Medical Research in America. Dr. Pearce, in opening his paper, stated that the past and future of his subject presented four important aspects. These were: (1.) The epoch making labours of isolated individuals. (2.) The application of the exact methods of physics, biology, and chemistry to medicine. (3.) The development of laboratories for the organized investigation of medical problems. (4.) The idea of diminishing suffering and ameliorating social conditions.

The first factor suggested such names as Vesalins and Paré. The second brought to mind the early English and French physicists, such as Cavendish and Gay Lussac, and later, Pasteur, Ehrlich, and Metchnikoff. The third reminded one of modern institutes, such as the Pasteur Institute of Paris or the Rockefeller Institute of New York; while the fourth, expressed by Pasteur as a desire to contribute to the welfare of humanity, should be seen in the work of every great investigator. To fulfil this latter ideal the medical worker should be actuated not by an abstract interest in human ills, but should have a direct interest in the prophylactic, hygienic, and social problems of the community in all its classes.

An important side of the subject was the relation of research to the university. Apart from other considerations research was likely to result in more competent and alert teachers. Such teachers would attract the best trained men, and the consequence would be an advancement of the standing of the university. It was evident that the establishment of research chairs was essential.

Such establishment had in the past come about in various ways. In some cases it was the result of the multiplication of chairs devoted to one general subject, as at Harvard, which has chairs of comparative physiology, pathology, and anatomy, each distinct from the chair responsible for fundamental undergraduate instructions in physiology, pathology, and anatomy. In both Harvard and Washington independent departments of preventive medicine yielded excellent opportunities for the study, not only of

infectious diseases, but also of causative industrial conditions, such as poverty and insufficient methods of preparing and handling foodstuffs. Further, similar examples could be found in the recently established departments for the study of tropical diseases at Pennsylvania and Tulane. The value of the union of hospitals and laboratories for such purposes has been of great value, while it should be remembered that in addition to the investigations of special diseases the universities have opened to them the broader field of the relation of social condition to disease (Richard Cabot). Outstanding instances of the latter activity might be found in the Rockefeller Foundation for the study of social conditions determining the occurrence of hook-worm disease, and the department of the University of Pennsylvania which is devoted to the sociological study of tuberculosis.

Professor Pearce predicted that the breaking down of the original hard and fast lines drawn about the institutes of medicine would continue. Immunity, bacteriology, and protozoal diseases would become separate and distinct studies. This and the tendency towards recognition of the hospital as a place for research must be two ever-increasing forces in the university. Aside from these the endowment of research chairs and research outside the university would stimulate the activities of the better university schools where research and teaching are combined. These latter functions should continue to be combined; for, while research professorships must be occasionally desirable, every professor of medicine or surgery should be engaged in constructive work. The head of a department of medicine should be a man familiar with the problems of clinical medicine, trained preferably as a pathologist and adequately grounded in physiology and chemistry. In order to make his work effectual he should have the use of beds in the university hospital.

In conclusion the speaker suggested that future advances in medical research would result from: (1.) Organized laboratory effort based on exact experimental methods. (2.) Organization of the laboratory and the hospital by the university, so that the advance of medical research might continue side by side with teaching, as a university function of benefit to the student, the faculty as well as to the state, the general public welfare, and the advance of civilization.

The paper was discussed by Prof. Leathes, Dr. Caulfeild, Prof. A. B. Macallum, Prof. Mackenzie, and Dr. H. B. Anderson. Mr. I. H. Cameron moved a vote of thanks, which was seconded by Prof. McPhedran.

MONTREAL MEDICO-CHIRURGICAL SOCIETY

THE ninth regular meeting of the society was held Friday, February 2nd, 1912, Dr. D. J. Evans in the chair.

LIVING CASES: 1. Aortic Aneurysm with Skiagram, by Drs. H. B. Carmichael and R. Wilson. Dr. Wilson showed three plates illustrating this case. A large plate, taken practically instantaneously, shows a very sharp outline, the apex as if caught in active contraction, this, making the heart smaller, has dilated the aneurysm very markedly. The two small plates of the aneurysm itself show the heart in contraction with the aneurysm dilated, and in the other the heart dilated, with the aneurysm very much smaller. The plates were taken at about one-thirtieth of a second.

2. Case showing the Thalamic syndrome by Dr. C. K. Russel.

DISCUSSION: Dr. C. K. Russel. Dejerine collected eight cases in which he got four autopsies and he presented these cases before the Neurological Society at Paris in 1906. He had already spoken of this syndrome in 1903 and 1905. With Dr. Roussy he elaborated this syndrome, presenting the microscopic slides of the thalamus with the lesion found. His description of these cases is absolutely identical with that of the present patient, and I have very little doubt that the lesion in this case is in the thalamus. I did think of a parietal lesion because of the astereognosis, but I do not think that a lesion here would cause the choreo-athetoid movements. Evidently the lesion was of vascular origin because of the sudden onset, but whether thrombosis or hæmorrhage I am not prepared to say. The blood pressure is at present a little high. A pure lesion of the posterior capsule would not give astereognosis, and one would have a definite loss of sensibility, to say nothing of the likelihood of injury to the optic radiations causing a hæmanopia. It is remarkable that none of these cases that Dejerine showed have lesions of the field of vision, though various mixed forms are of course recognized where the lesion involves the thalamus and the internal capsule fibres.

The Vagaries of Gonorrhœa by Dr. J. R. Goodall. The following are the points taken up by Dr. Goodall: biology of the gonococcus, its modus operandi; the wide ranges in degree of susceptibility of patients; immunity and septicæmia; importance of pregnancy and especially of the puerperal state following abortion, miscarriage, or full term labour; clinical facts in respect to gonorrhœal cystitis, sterility, and the antagonism of other diseases to gonorrhœa; cryptic gonorrhœa in the parous woman; the great danger of the

curette, and lastly, some of the close and remote results of conservative operations in gonorrhœa.

Discussion: Dr. F. J. Shepherd. I was very much interested in this paper and I think I even understood it. I should like to object to one statement, namely, the revolutionary effect of Dr. Winter's paper in that sterility often rests with the male. The general surgeons have known this for over thirty years, but the gynæcologists have never really recognized this till more recently, and many have been the operations performed upon the female for sterility when it was well recognized among surgeons that the male was at fault. It was well known that double orchitis, posterior urethritis, etc., produced sterility.

Dr. W. W. Chipman: Dr. Goodall, in referring to the woman's side in the question of sterility has emphasized Winter's work, and has merely instituted a plea, and a very forcible one, against many operations being performed upon women by reason of their sterility. What Dr. Shepherd has brought out has been known by most of us for a good many years. Certainly I know that as far as my own experience in Montreal is concerned everything is done to discourage a woman from having any operative measure performed upon herself for the sake of sterility. I enjoyed the review Dr. Goodall has given of the life history of the gonococcus; he has brought out clearly the life history of the organism as it exists, and has reminded us that while it is easily killed outside the body, yet how difficult it is to reach the organism when once inside. As to the question of general systemic infection, it occurs very rarely save where there has been some trauma; the only exception that I have met with to this general statement is that I have seen several times systemic infections follow acute gonorrhœa in children. This is a very acute disease in children and I have seen it where there has been no trauma. It is extremely rare in the adult unless there has been some trauma. Another interesting point is that gonorrhœal cystitis does not exist. The antagonism that syphilis exerts is also a new and interesting thing, and also the point that in acute fevers the progress of these is after all the best thing that could happen to a woman suffering from chronic salpingo-oophoritis. Latent gonorrhœa, of course, presents after all the greatest number of vagaries. The description Dr. Goodall gives that it really begins in the upper half of the vagina and the stress he has laid upon the importance of granular vaginitis I thoroughly agree with.

The uterine curette should only very seldon be used at all. I should say that a man with an average practice who curettes six

or eight cases in the year has done all that he should do with the curette. Especially is this true, of course, in patients suffering from any chronic infection in the pelvis, and certainly from gonorrhœa. Only use the curette where there is a distinct indication for its use—increased hæmorrhage and increased inter-menstrual discharge, conditions in which you may use it safely, provided that the uterine appendages are healthy. Dr. Goodall's plea for conservatism we all agree with; one cannot be too conservative in these cases. Encourage the patient to undergo treatment, do not ask her to come to your office for a tampon once or twice a week, because that treatment may go on for two or three years and the injury sustained by walking there and back may undo any good she may have acquired. Put her to bed or confine her to her room for periods of six weeks and treat her systematically and you will get a result in six weeks that you won't get in three years if she walks back and forth to your consulting room.

D. N. Viner: I should like to ask Dr. Goodall a few questions: First, I have had occasion to see quite a few cases of Neisser's vulvovaginitis in infants and young children, and I would like to know what are the chances of ultimate recovery and of child-bearing in these cases. Secondly, if the infection of the ovaries and tube is not gonorrhœal is the old tampon method of treatment objectionable? Finally, what is the treatment for skenitis?

Dr. M. Lauterman: One or two details interest me especially, and I would like to know if Dr. Goodall has considered in any sense the relationship between the gonococcus and the other microörganisms that are usually found associated with it. It seems to me that the classical case is very largely the exception rather than the rule, and while I have never done any work in this connexion myself, I imagine that there would be a field which would give considerable information if it were possible to ascertain the relationship existing between the presence of the colon bacillus, for instance, when associated with the gonococcus. It seems to me that that constitutes the explanation in some instances of systemic infections. I had two cases following, as far as we were able to determine, a pure vaginitis. I can only agree with what Drs. Chipman and Shepherd have said with reference to sterility in the male having been known many years before Winter's well-known article was offered to the profession. The relation between gonorrhœa and syphilis and other acute infectious diseases exists in other spheres and as regards other microörganisms. There is no doubt that the phagocytosis that is produced by one form of organism influences any other organism that

may be found elsewhere in the economy. At Olshausen's clinic it was his rule before curetting for sterility to leave a vaginal tampon well up against the cervix for twelve to twenty-four hours, and in the great majority of cases gonococci were to be found in the very small bead of greyish exudate on that portion of the tampon that was directly applied to the os. As to the so-called cure that Dr. Goodall refers to, there is no one part of the profession to blame for this, the profession generally is to blame, they do not sufficiently impress the male sufferer with the importance of his disease and with its danger to everybody with whom he comes in contact, and for this reason as soon as the patient experiences relief from the most prominent symptoms that worry him, he considers himself cured. I have had cases of men going along thinking that they were perfectly well and at least 75 per cent. showed the presence of latent or residual gonorrhœa. I do not think I am overstating the position when I say that 75 per cent. of those affected and treated by the routine methods carry about residual gonorrhœa and are in a position to infect others; men once infected, in the majority of cases, remain infected, and, what is even more important, infective.

PATHOLOGICAL SPECIMENS: Dr. L. J. Rhea.

1. Patient aged fifty-six years; died of lobar pneumonia. Specimen shows thrombus in vessel leading to infarcted area; it is undergoing necrosis and abscess formation.

2. Male, dying of pneumonia. At autopsy liver showed great number of small cysts, which were due to the bacillus ærogenes capsulatis.

3. Specimen from a man aged sixty-eight years, who was assaulted on the street. Three months later he began to complain of headache and dizziness, and inequality of the pupils. Died of meningitis. An abscess was found on the right occipital lobe and acute purulent meningitis.

CASE REPORT: Regeneration of the liver, Dr. F. B. Gurd.

DISCUSSION: Dr. J. Kaufmann: With regard to the literature of such cases, Dr. Gruner sent to the pathological museum of the college about a year ago a very similar specimen to that just described, the only difference being that the right lobe was even smaller. I would like to ask Dr. Gurd what were the changes in the circulation in his case in the liver, and if there was any existing pathological condition in the vessels which form the portal vein. Dr. Gruner regarded the condition as being syphilitic in origin.

Dr. F. B. Gurd: In the liver itself there appeared to be a reproduction of the liver lobules as such, apparently by a budding of lobules *in toto*. The vessels were in proper relation to the cells and apparently of normal size and properly formed.